



CIRCULATES IN EVERY PROVINCE IN CANADA

# CANADIAN **MACHINERY** AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied fields. Published by the MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XIV

Publication Office: Toronto, August 12, 1915

No. 7

## MADE IN CANADA

### National-Chapman Elevating Trucks are now a Canadian Product

The New Canadian-Made Truck, manufactured under Canadian Patents

#### NOTE THE EXCLUSIVE FEATURES

One hand control in addition to foot lever for lowering loads.

Loads lowered with either hand or foot control.

Complete turn of head.

Truck turned in its own length.

We are the originators of the use of Hydraulic check for lowering loads.

#### The National Check is Always in Service

Thousands of concerns are using our equipment.

#### THE SAVING

50 to 90 per cent. average saving. Much larger in many cases.

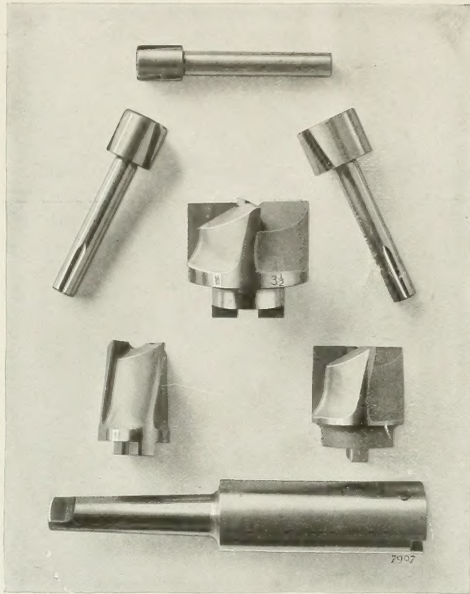


National-Chapman Elevating Trucks shipped f.o.b. Brantford, Ontario. Ask for our new catalog C-E, and address all inquiries to

**NATIONAL SCALE COMPANY**  
CHICOPEE FALLS, MASS.



# Make Your Own Combination



## Holders

End of holder is milled to receive the driving lug of the cutter and there is also a hole and set screw to accommodate the shank of the guides.

## Guides

Are of hardened tool steel. They are held in place by means of a set screw in the holder engaging a V-slot in the shank of the guide.

## Cutters

Can be furnished of either carbon or high speed steel.

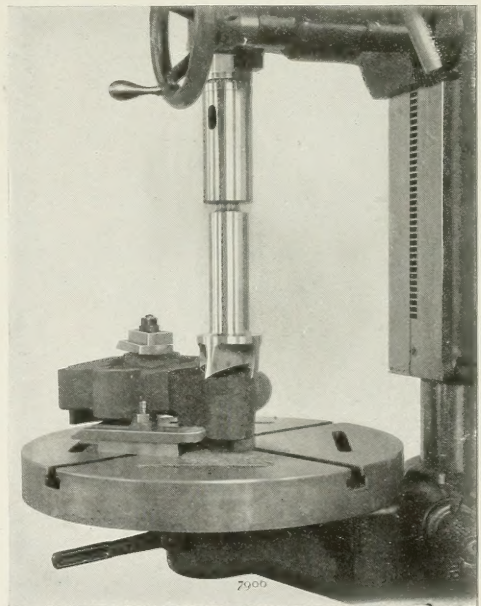
The shank of the guide passes through the hole in the cutter and the shoulder between the guide and its shank keeps the cutter in place. Cutters can be sharpened on the face and the guide is simply pushed further in the hole after grinding.

Write for catalog "Small Tools" showing our complete line.

For every counterboring job you can make immediately the right combination of holder, cutter and guide if your tool room is equipped with

## P. & W. Interchangeable Cutter Counterbores

Holders, Cutters and Guides furnished in wide range of sizes.



Spot Facing  
with a P. & W. Interchangeable Cutter Counterbore

Place a trial order with our nearest store.

## Pratt & Whitney Company of Canada, Limited

DUNDAS  
Ontario

MONTREAL  
723 Drummond Bldg.

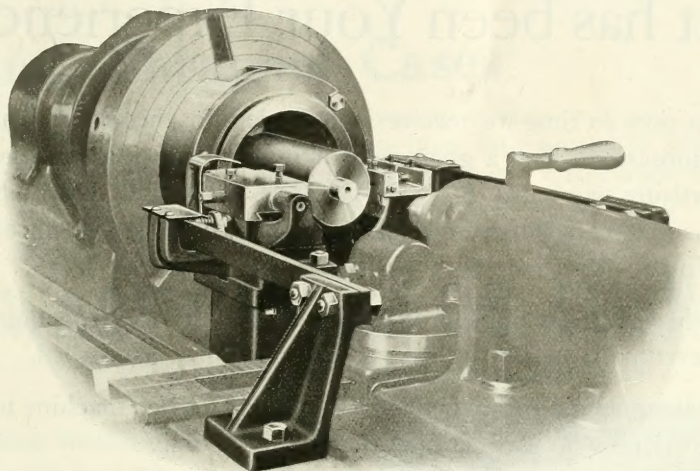
WINNIPEG  
Bank of Hamilton Bldg.

VANCOUVER  
B.C. Equipment Co.

*The advertiser would like to know where you saw his advertisement—tell him.*



# Why Go to a big expenditure for Machinery for Shell Making?



WAVE RIBBING ATTACHMENT FOR 4.5" H.E. SHELLS.  
Similar Fixture also supplied for 18 Pr. Shrapnel and 18 Pr. H.E. Shells.

*We can supply you with attachments to  
fit your regular lathes for all operations*

THE OUTPUT WILL PROVE VERY INTERESTING. Let  
us tell you about it and quote you prices.

## The John Bertram & Sons Co. Limited

Dundas, Ontario, Canada

MONTREAL  
723 Drummond Bldg.

VANCOUVER  
609 Bank of Ottawa Building

WINNIPEG  
1205 McArthur Bldg.



*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



# The Publisher's Page

By B.G.N.

## What has been Your Experience?

From time to time we receive information to the effect that our subscribers find a great deal of interest and value in the advertising pages of CANADIAN MACHINERY. One will tell us that he purchased a certain machine solely as a result of reading an advertisement in our paper.

Another will relate how he was induced to send for a catalog, and eventually placed an order, after a salesman had called.

Perhaps another recommended a certain advertised machine to some friend who was not a subscriber at the time.

And so on.

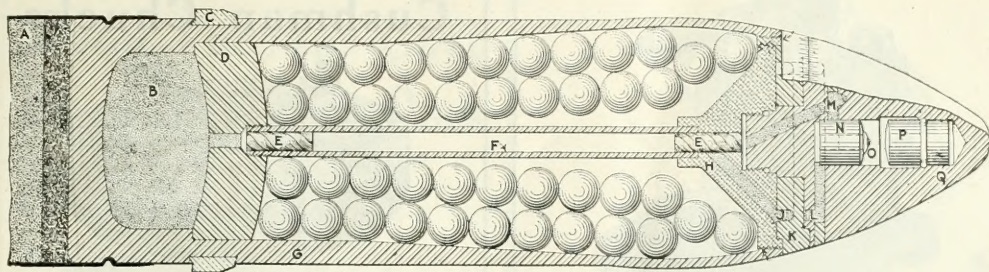
Now we believe every reader is more or less influenced by and interested in the advertising pages of CANADIAN MACHINERY. We will very greatly appreciate it if you will write us, outlining your own personal experience in this connection. You can make your story as long or short as you wish. We will gladly repay you for the time required to relate your experiences, and your name will not be published if you prefer it.

We want to show other readers how to get the most from our advertising pages.

**Canadian Machinery & Mfg. News**

143-153 UNIVERSITY AVE.

TORONTO, ONTARIO



## Making Shrapnel Cases

presents some interesting problems. A vast number of these busy little agents of destruction are now being turned out in Canada and United States for the war in Europe—a good percentage being machined by tools treated in

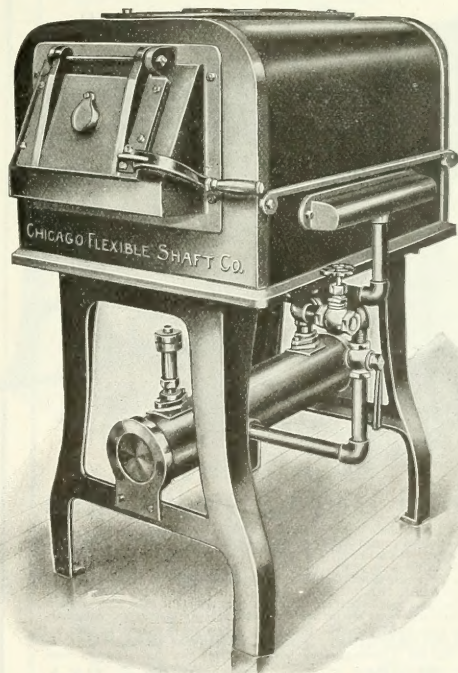
## STEWART GAS and OIL FURNACES

*"They Keep Your Tools Fit"*

The simple method of Heat Control enables the operator to get the **right** temperature for hardening or tempering the tool being treated and to hold it indefinitely.

Modern shop practices have rendered obsolete the old guess-work of heating objects to be hardened in an open fire and dumping them into water when the manipulator "thought" they were at the right temperature.

**Put your Heat Treatment of metals on a scientific basis—it pays. Write us for details on the 100 odd types of STEWART FURNACES.**



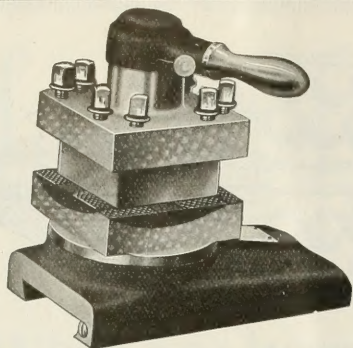
**Chicago Flexible Shaft Company**

210 to 230 Ontario St.

Chicago, Ill.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*





## Particularly Adapted to the Manufacture of Shrapnel

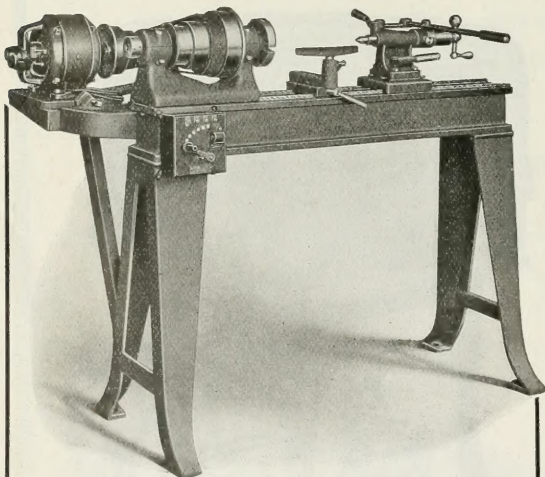
Your Lathe Needs A NEW TOOL POST, One of the Modern Multiple Type.

You can no longer afford to use the old style single tool holder.

Give us the size of the dovetail on your lathe carriage and height to lathe center; we will quote you price on a Modern Tool Holder that we guarantee will increase your production, and give you some interesting facts about Lathe Turrets.

No matter what make or size of lathe—we can fit it.

**Fay & Scott, Dexter, Me.**



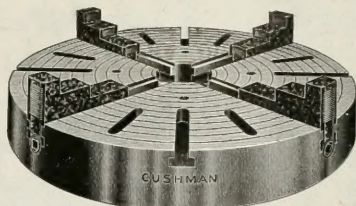
## Motor Driven Speed Lathe

This style of motor drive employs a constant speed motor mounted on a plate having an extension arm to support a bearing for the outer end of the motor shaft. The motor plate is fitted to a slide on a shelf which is securely fastened to the back of the lathe bed. The motor plate is moved by means of a screw which tightens or loosens the belt. A four-step cone pulley on the motor shaft is belted to a four-step cone pulley on the spindle. This gives the same speed variation as when a countershaft is used, and by means of various size cones on the motor a wide range of speeds are obtainable.

The lathe spindle is made from high carbon steel, ground to size, and running in self-oiling bronze bearings. The tailstock has screw and lever feed. The bed is cross-bed and all clamping levers are above the ways.

**J. G. BLOUNT CO. - Everett, Mass., U.S.A.**

## Cushman Chucks



When you buy a "Cushman" Chuck you are absolutely sure of getting one having strength, accuracy and durability. Being specialists in these goods we are able to furnish Chucks of quality at a very moderate price.

Our line of styles and sizes is very complete—

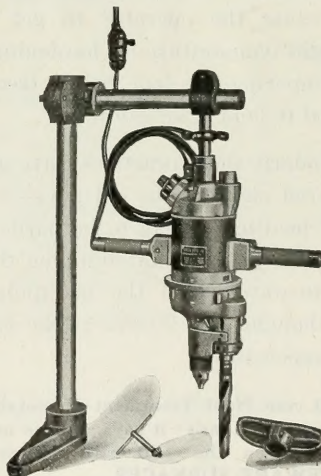
**Lathe Chucks, Drill Chucks, Centering Chucks, Portable Face Plate Jaws**

Our regular chucks are known as the heavy pattern, but we now have a new line called "Blue Line" Chucks, made entirely of steel.

Let us send you our catalog.

**The Cushman Chuck Co.**  
Hartford, Conn., U.S.A.

## Stow Two Speed Two Spindle Drill



The only tool of its kind on the market. Fills a long-felt want. Will cut your cost.

**We make drills of every size.**

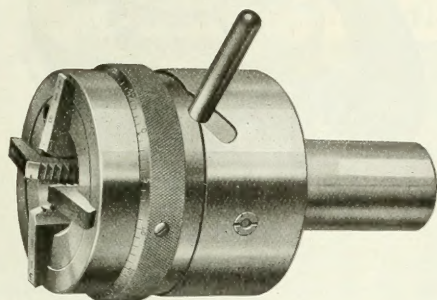
**STOW MFG. CO., Binghamton, N.Y., U.S.A.**

London, England, Stock: 85 Queen Victoria Street

Oldest Portable Tool Manufacturers in America.

*The advertiser would like to know where you saw his advertisement—tell him.*

## Good Threads Cost Less Than Poor Ones



Wells Self-Opening Die—Model B.

The advent of the W.S.O.D. in his shop, has opened the eyes of many a manufacturer producing screw threads to the fact that he can

### Increase Production Decrease Costs and Cut Perfect Threads

all at one and the same time.

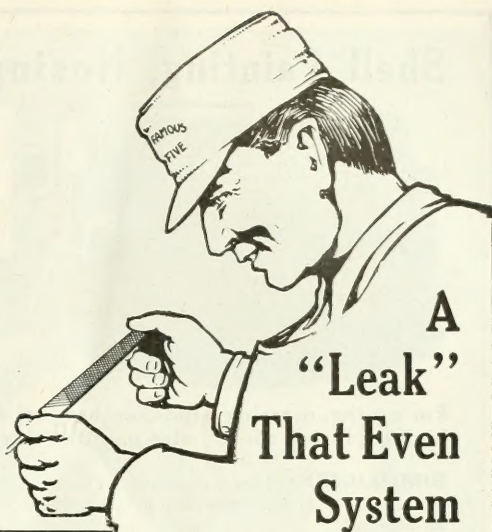
Do you want us to prove it? We are ready.

We want to send you the booklet describing the different models. Are you willing to try the W.S.O.D. in your shop under your own conditions?

**Wells Brothers Company**  
of Canada, Limited  
GALT - ONTARIO

Sales Agents:

The Canadian Fairbanks-Morse Co., Limited, Montreal,  
Toronto, Vancouver, Winnipeg, St. John, Calgary.



## A "Leak" That Even System Couldn't Catch

A MANUFACTURER was boasting that his shops were so systematized, that no "leak" nor waste could possibly occur.

We knew something of his product—equipment—methods—and output. So we asked how many files he used each year.

When he mentioned the figure, we said we could show him a "leak" that would astonish him.

"Do it," he said.

And we did!

Showed him how his workmen were using their files too long. Were wasting time getting the last bit of wear from each file—instead of discarding them when their BEST efficiency was gone. Were saving "pennies" in file-cost—and throwing away "dollars" in filing-time.

We proved to him—by personal experience in his own shops—on his own work—that the more files he used the more money he SAVED. That the time saved and the extra work produced by using only EFFICIENT files, more than paid for the slight extra cost of additional files. While his old way of wearing-out files costs many times its price in wasted labor.

He "saw the light." To-day, his workmen use only EFFICIENT files. And of course they're the "Famous Five":

**KEARNEY & FOOT  
GREAT WESTERN  
AMERICAN  
ARCADE  
GLOBE**

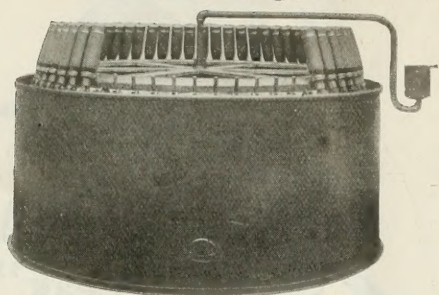
(Made in Canada)

**Nicholson File Company**  
Port Hope Dealers  
Everywhere Ontario

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



## Shell Painting, Nosing and Banding Machines

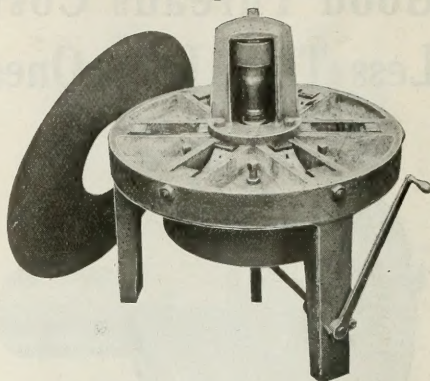


For nosing, pressing bands on shrapnel and high explosive shells; also painting shells.

**SIMPLICITY:** That is the beauty of these machines; they are so simple that a woman or even a child can control them. This is an important feature in reducing operating expenses.

**Banding Press** is sold without nosing attachment if desired.

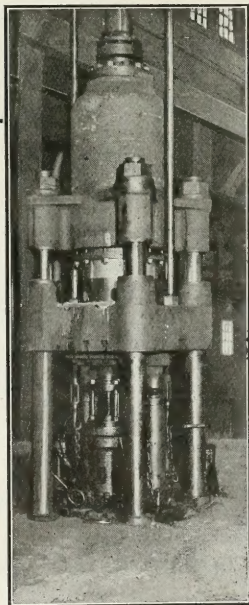
**Painting Machine** is operated with an ordinary air drill, and, if desired, a heating coil under table, enclosed in a sheet steel shell, can be supplied, as shown in cut.



**Canadian Locomotive Company, Limited, Kingston, Ont.**

SALES HANDLED EXCLUSIVELY BY

The John Bertram & Sons Company, Limited, Dundas, Ontario, our agents for these machines



PIERCING PRESS

## Hydraulic Presses —for—

### Shell Manufacturing

We are making

### HYDRAULIC PRESSES

for Piercing and Drawing

### Shells and Projectiles

and are in a position to give

**Prompt Delivery**

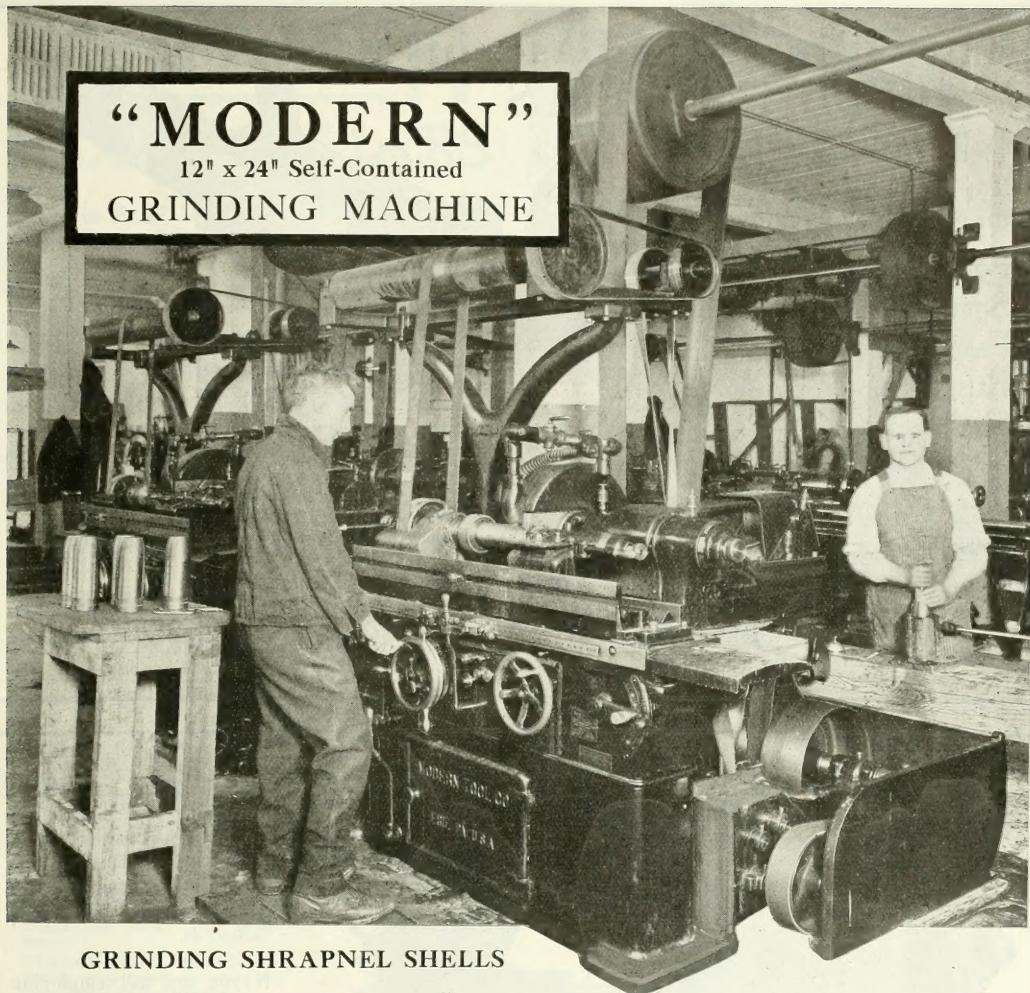
**The William Cramp & Sons Ship  
and Engine Building Company**  
PHILADELPHIA, PA.

*The advertiser would like to know where you saw his advertisement—tell him.*



# "MODERN"

12" x 24" Self-Contained  
GRINDING MACHINE



## GRINDING SHRAPNEL SHELLS

We have recently sold a large number of these machines in Canada, completely equipped for Shrapnel Work. Their heavy, rigid construction makes them very desirable for shell work or on any production where speed and accuracy are very essential.

Absolute central control—all levers and hand wheels concentrated on front of machine—quickly and easily operated. Work speeds and table feeds entirely independent and cover every range within the capacity of the machine. These are derived from our patented single-unit speed-change mechanism. Automatic feed at either or both ends of table reverse. Auxiliary feed for bringing wheel into work without traversing table. Positive stop provided when feeding wheel by hand. Steady rests that are universal in all their movements and have positive stops for grinding duplicate work. Interchangeable wheel centers.

Large diameter wheel with wide face.

Our patented speed-change gear box allows for 12 work speeds and 6 table feeds. All gears are in mesh at all times. Equipped for all classes of straight and taper cylindrical work.

Send for blueprints and estimates.



## Modern Tool Company

Main Office and Works :

State and Peach Streets, Erie, Penn'a

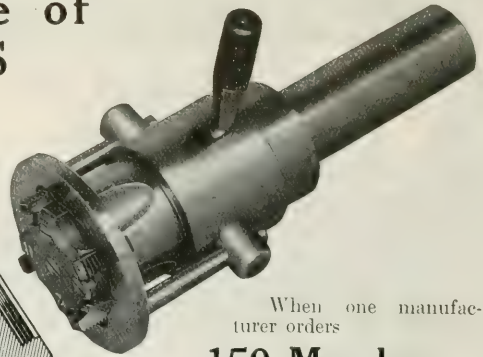
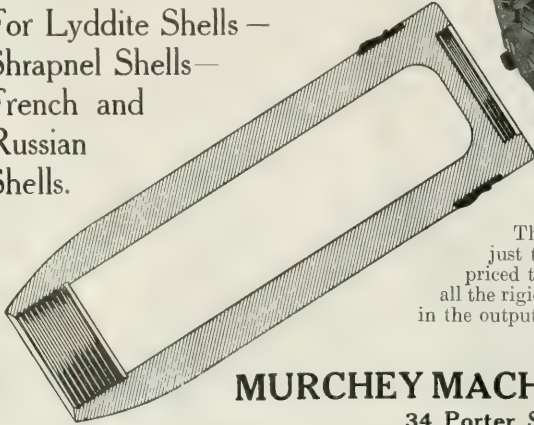
Canadian Agents : Rudel-Belnap Machinery Co., Toronto and Montreal



## Threading the Base of LYDDITE SHELLS

Here is the Tool—Murchey Collapsing Tap with overhanging chasers—doing the work and doing it well.

For Lyddite Shells—  
Shrapnel Shells—  
French and  
Russian  
Shells.



When one manufacturer orders

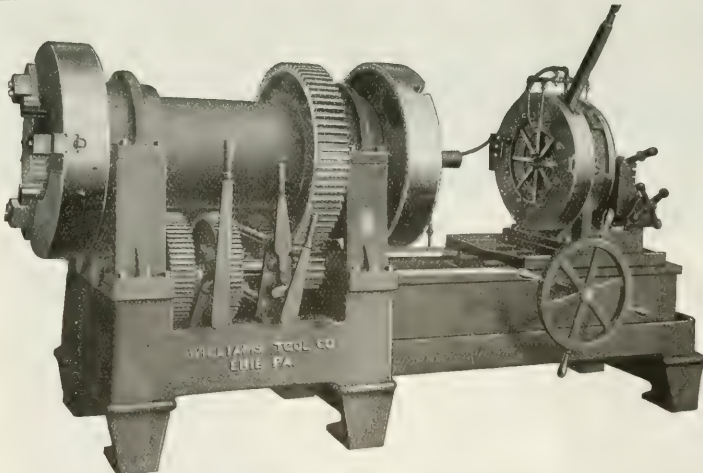
### 150 Murchey Collapsing Taps

There must be a reason. There is a reason. It's just this—these taps are taking the place of higher-priced tools, and they are speeding up production with all the rigid accuracy and quality of work that is demanded in the output of shell work.

*Write for details and catalog.*

**MURCHEY MACHINE & TOOL COMPANY**

34 Porter St., Detroit, Michigan



The gas light was a big improvement over the tallow dip, but it had to give way to the electric light; and the Tungsten has superseded the little glimmer that once delighted us.

If you are still employing pipe-cutting methods as antiquated as the tallow dip, you need a Williams Pipe Machine, which occupies the same position in the pipe-cutting field as the Tungsten does in the lighting world, to bring you up-to-date.

*Let us quote you prices and terms: any machine to cut 10 sizes of pipe between 1-4 inch and 18 inch, with any kind of power.*

Anyone making, selling or buying a pipe machine, claimed to be a Canadian-made Williams Pipe Machine, does so without right or authority from us, and is liable to prosecution for damages.

**Williams Tool Co., Erie, Pa., U.S.A.**

AGENTS:

**A. R. WILLIAMS MACHINERY COMPANY**

ST. JOHN, N.B. TORONTO WINNIPEG VANCOUVER

*The advertiser would like to know where you saw his advertisement—tell him.*

# KEMPSMITH

## PLAIN MILLERS

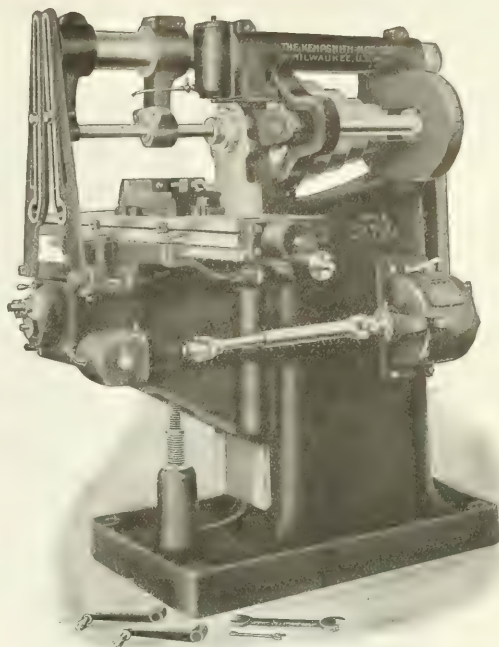
Built in Four Sizes Knee Type

Two Sizes Lincoln Type

These milling machines are characterized by simplicity of operation, rigidity of design and highest accuracy in construction.

Our literature on the construction and use of Milling Machines will be found interesting and suggestive. Sent gladly on request.

**KEMPSMITH MFG. COMPANY**  
MILWAUKEE, WIS.



# A MODERN SAVER

of Time, Money, Space and Labor

Here is a machine that is well worthy of your attention—our "Double C Punch and Shear" with 48-inch throat.

This machine has an enormous capacity for doing rapid, accurate and economical work of quality.

Let us send full description. If you are interested in up-to-date money-saving machinery you cannot afford to remain uninformed.

We manufacture a complete line of

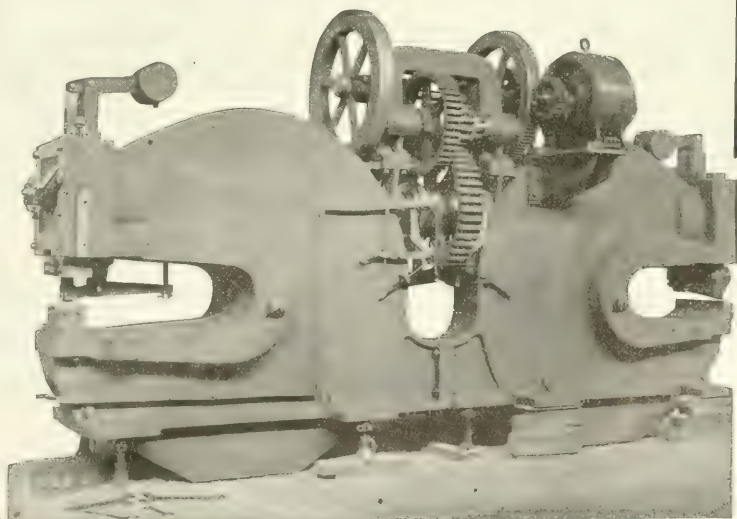
## LABOR-SAVING MACHINERY

all kinds and sizes, for  
Structural Iron Works, Railroad  
and Locomotive Shops, Boiler  
Shops, Rolling Mills, Agricultural  
Implement and Plow Shops, etc.

**The Long & Allstatter Co.**  
HAMILTON, OHIO

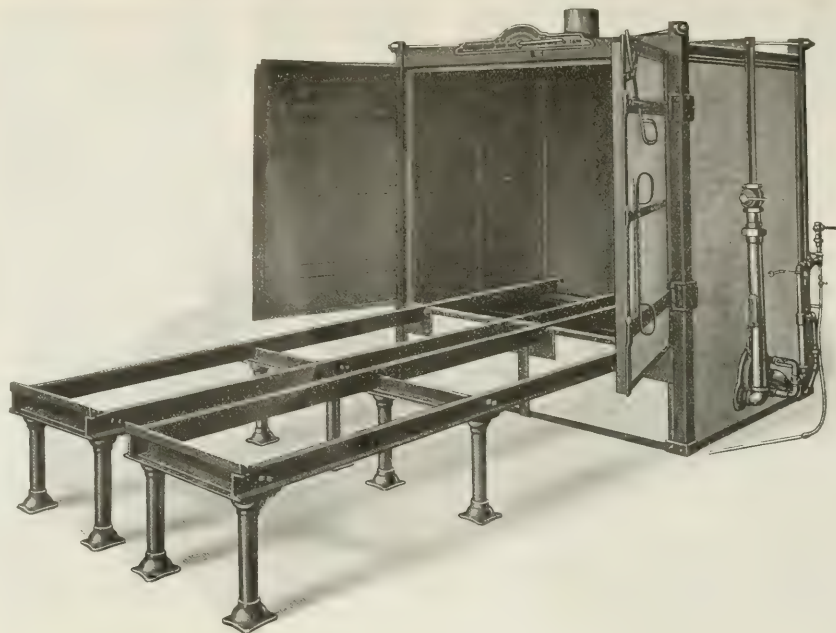
Canadian Representatives  
**RUDEL-BELNAP CO.**

Montreal, P.Q. Toronto, Ont.



*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*





**A convenient type of Crawford Sectional Oven largely used by manufacturers turning out Shells up to twenty-eight pounds each.**

The method of heating explained in previous issues is the same with all types of Crawford Ovens—no direct flame coming in contact with the material in the oven.

Either city, natural, gasolene or producer gas can be used with any type of oven.

Ovens and trucks built for baking the varnish or finish on any number or size of shells required at a time.

**The Oven Equipment & Manufacturing Company**  
NEW HAVEN, CONN.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY CO., LIMITED, TORONTO, CANADA

*The advertiser would like to know where you saw his advertisement—tell him.*

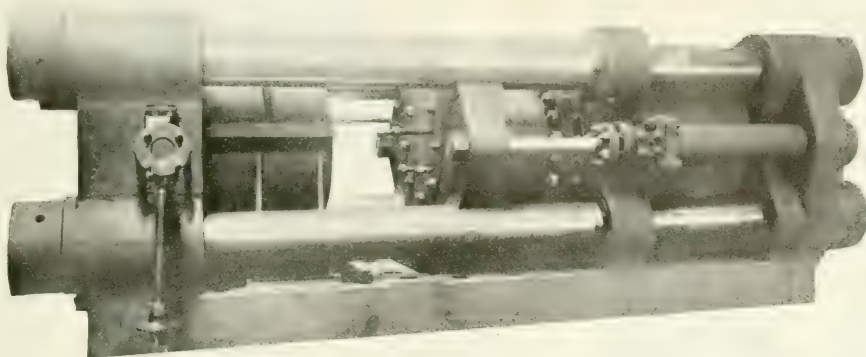
# 1836 **SOUTHWARK** 1915 **HYDRAULIC MACHINERY**

## FOR ALL PURPOSES

Presses  
Riveters  
Cranes  
Hoists

Jacks  
Pipe Fittings  
Pumps  
Accumulators

Intensifiers  
Leather Packings  
Valves  
Gauges



2000-ton Southwark-Extruding Press

## OTHER SOUTHWARK PRODUCTS

Centrifugal Pumps  
Turbo Generators for Direct and  
Alternating Current  
Turbo Blowers  
Turbo Pumps

Surface and Jet Condensers with their  
Auxiliaries

Southwark-Harris Valveless Oil Engine.  
for stationary and marine use (built in  
sizes up to 1000 B.H.P.)

## Southwark Foundry & Machine Company

PHILADELPHIA

Founded 1836

Old Colony Building, Chicago

Brown-Marx Building, Birmingham

"First Builders of Large Centrifugal Pumps in America."

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## U. S. Electric Drills and Grinders

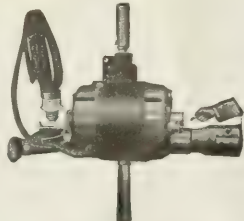
Save Time, Labor and Money



3 SIZES.  
3-16 inch, W.G.T. 6 lbs.  
1/4 inch, W.G.T. 9 lbs.  
5/8 inch, W.G.T. 12 lbs.

All motors wound for 110 or 220 volts. Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



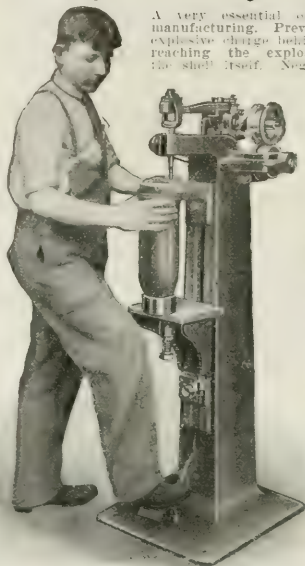
1/4 inch—2 SPEED.  
Speed, 400-750 R.P.M.

For Sale By  
The Canadian Fairbanks-  
Morse Co., Limited

Montreal. St. John, N.B., Toronto, Winnipeg, Calgary,  
Vancouver.

THE UNITED STATES ELECTRICAL TOOL CO.  
CINCINNATI, OHIO

## Riveting Base of Explosive Projectile



A very essential operation in shell manufacturing. Prevents gas from the explosive charge behind the shell from reaching the explosive contents of the shell itself. Neglect of this operation would probably cause the shell to explode and kill or injure the man firing it.

After the shell is in position the riveting is started and the shell is finished in complete readiness by hand and with the machine, striking about 200 blows per minute.

The plug can be inserted perfectly into the base in about 10 seconds.

CHANGE OF FIXTURE EN-  
ABLES MACHINE  
TO BE ADAPTED  
FOR 4 1/2, 10 LBS.  
OR 16 LBS. SHELLS  
EVEN LARGER  
THAN 4 1/2.

Drop a line for further particulars.

The Grant  
Mfg. &  
Machine Co.  
Bridgeport, Conn.



## SPECIAL SPRINGS

AND

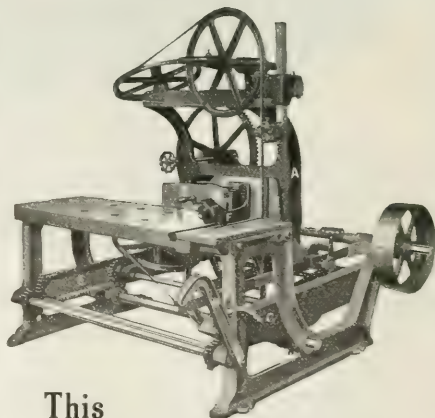
## Screw Machine Products

MADE ON CONTRACT

to the most exacting specifications,  
and deliveries made as desired.

Ask for Booklet 6-T.

Established 1857  
THE WALLACE BARNES COMPANY  
218 SOUTH STREET, BRISTOL, CONN., U.S.A.  
Mfrs of "Barnes made" Products  
Springs, Screws, Machine Products and Rolled Steel and Wire



## This Shinn Metal Cutting Band Saw

is specially adapted to requirements of  
Canadian Shrapnel Shell Manufacturers

Will cut all kinds of metals at any angle. Its rapidity and accuracy will meet your every need.

AS TO PRICE you cannot get a better saw anywhere for the money!—

N 1—Capacity 12" by 11" .....\$175.00  
N 2—Capacity 12" by 17" .....\$200.00

Canadian agents wanted.

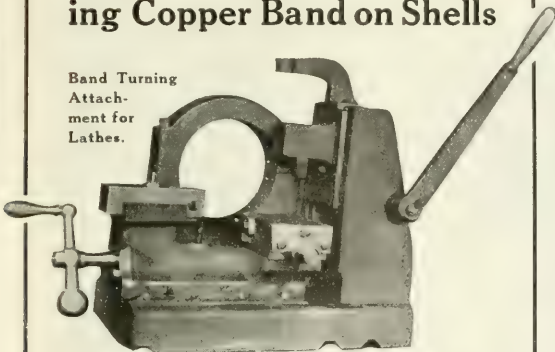
IMMEDIATE SHIPMENT—write for particulars to

M. E. SHINN & COMPANY  
1846 West Lake Street CHICAGO

The advertiser would like to know where you saw his advertisement—tell him.

## A Time-Saver for Turning Copper Band on Shells

Band Turning  
Attachment for  
Lathes.



This attachment will fit any engine lathe, and with its use you can turn the copper band on Shrapnel Shells down to size required and burnish them all in one operation.

With this device we will guarantee an output of

**50 Turned Copper Bands per Hour**

Used with a specially constructed steel chuck, casting of which can be finished on the lathe on which the attachment will be used.

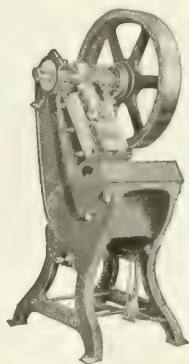
Castings are supplied by us.

WRITE FOR PARTICULARS.

**LYMBURNER LIMITED**

5-15 Commissioners St. Montreal, P. Que.

## A Combination of Rigidity, Accuracy, Simplicity and Ease of Operation



Bodies are inclinable and convenient for handling dies and material. Slides are long and well gibbed.



## Inclinable Power Presses

reduce the maintenance cost of both machine and tools.

Built in eighteen sizes.

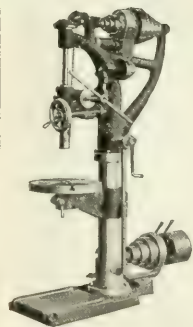
Adapted for many operations in the manufacture of tin cans, pieced tinware, metal packages, brass goods, electrical goods, trimmings, etc.

Catalog 2-G, describing them, sent on request.

Visit our exhibit at the Panama-Pacific International Exposition, Machinery Palace, Block 16.

**E. W. Bliss Co.,** 20 Adams Street,  
Brooklyn, N.Y., U.S.A.

CHICAGO OFFICE: 622 West Washington Boulevard.  
DETROIT OFFICE: Dime Bank Building.



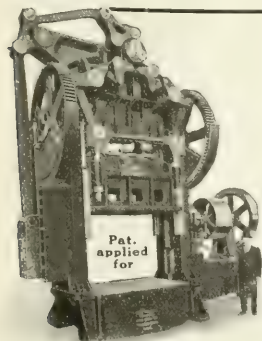
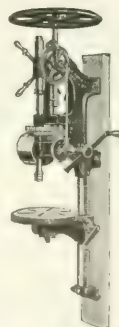
## "CANADIAN" DRILLS STRONG—DURABLE—EFFICIENT

Our position, as the largest manufacturers of Drills, Forges and Blowers, was gained by our knowledge of the users' requirements

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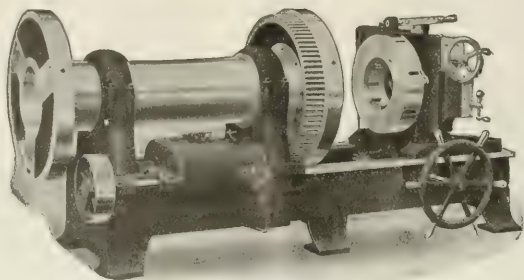
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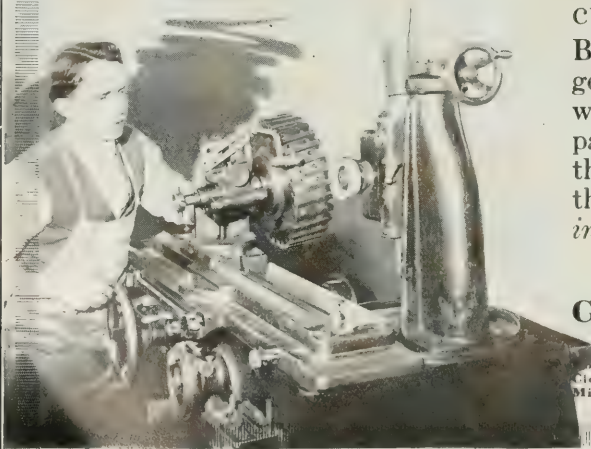
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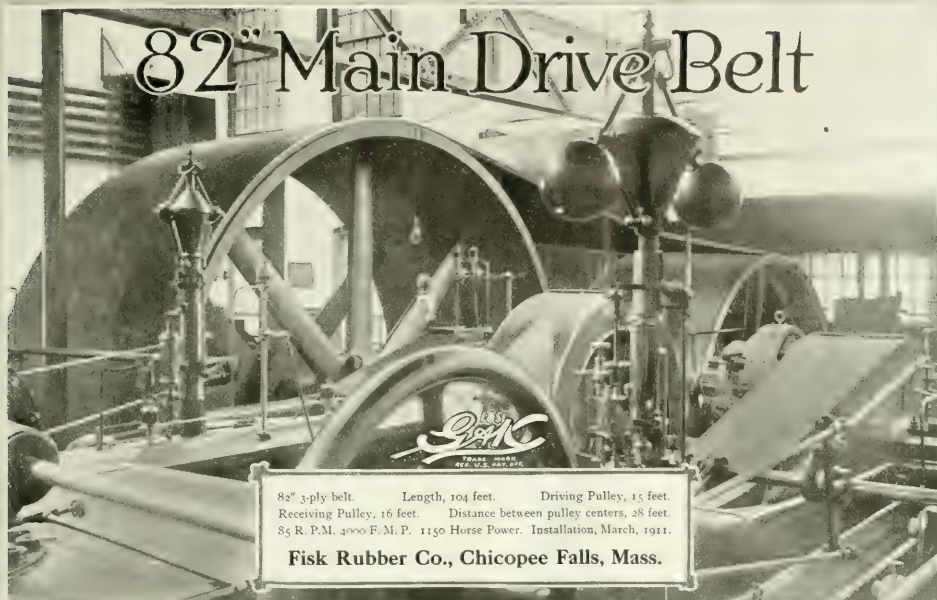
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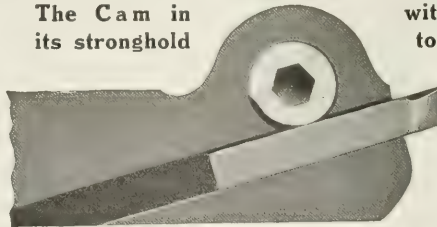
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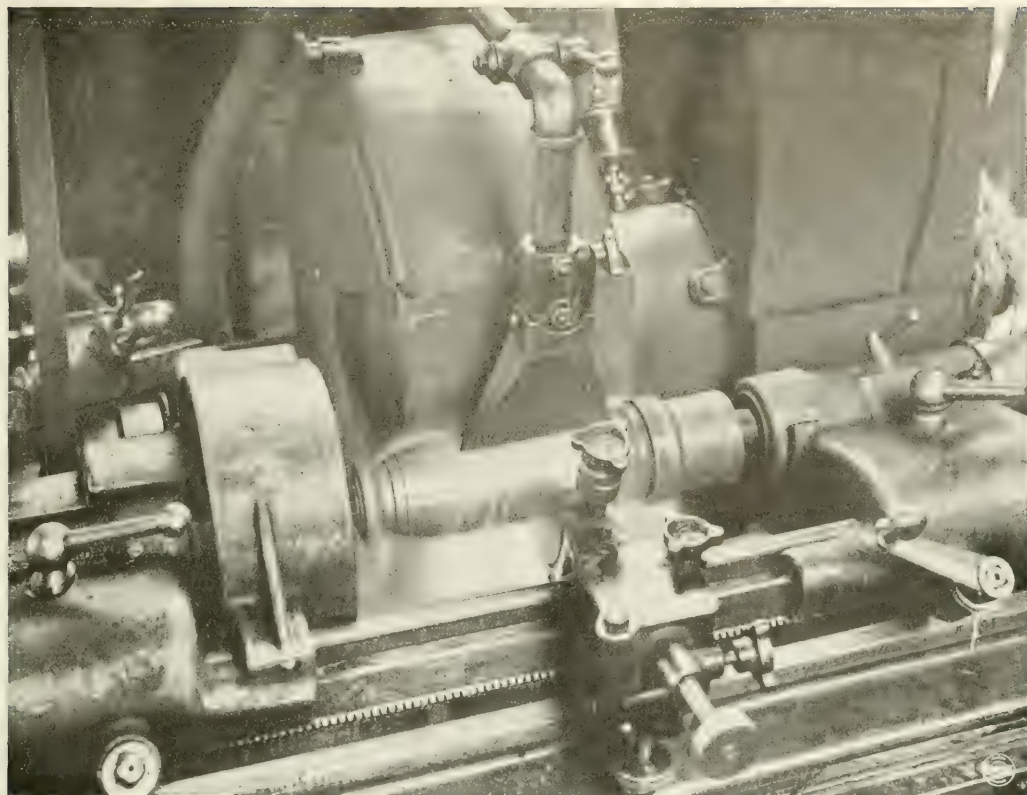
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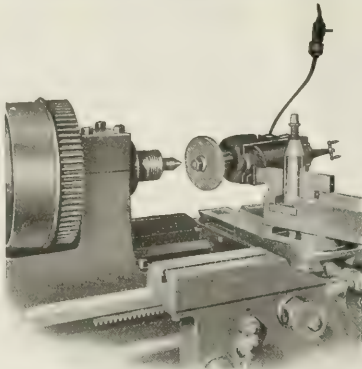
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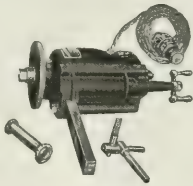
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The U.S. Electric Grinder  
Showing equipments supplied

These tools are particularly useful for lathe center grinding and other small grinding jobs on the lathe.

They will prove especially valuable in shell work as they will enable any shop to keep all lathe centers trued up with least loss of time.

They absolutely do away with the necessity of first annealing, then turning down, and re-hardening centers.

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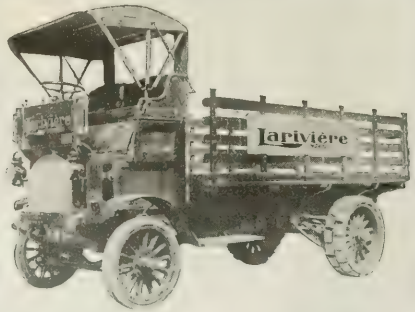
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## 5 Ton Mack Demonstration Truck

**FOR LESS THAN COST**

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Similar to above illustration, in first class condition, having being used for demonstration purposes only.

### 3½ TON ELECTRIC TRUCK

Complete less body and batteries.

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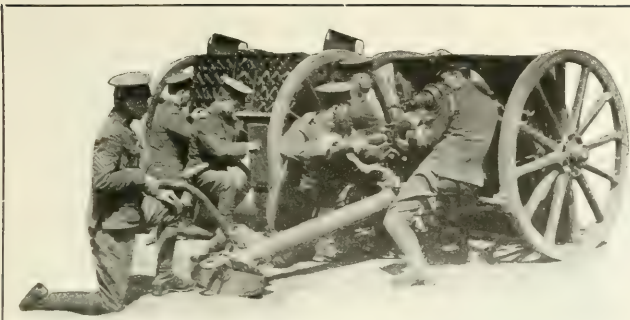
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## Staff Article

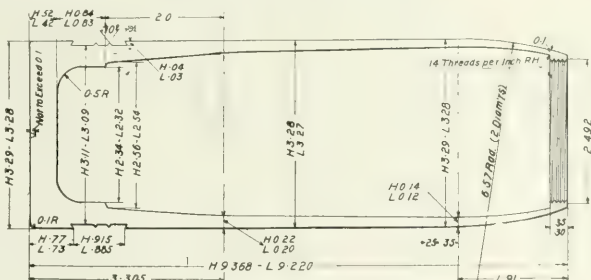
*Resourcefulness in gripping and mastering the details of shrimp-shell manufacture has not, as will have been noticed from our leading articles in this and recent issues, been confined to any particular section of Canadian mechanical engineering enterprise. The plant here featured, although not a leader in point of size, earns that distinction in its output.*

As the equipment was installed solely for the purpose of making shells, it was possible to make the layout to suit the sequence of operations. This feature in itself saves a lot of time and labor in handling the shells and also materially serves to increase production. Although some of the machines are not new, efficient

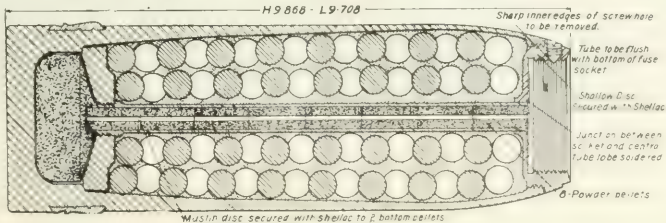
The first operation follows the practice adopted in the majority of plants and consists in cutting off a part of the open end of shell, which is of course ragged, sufficient metal having been left on for cleaning up. A cutting off machine supplied by the F. E. Garvin Co., New York, is used for this work. The shell case is secured in a chuck, the cor-

The shell casing is not perfectly concentric and this defect has to be guarded against in subsequent operations. To reduce the possibility of error from this cause the base of shell is centered, the center being retained until all machining operations on the shell body have

The shell case is  
next rough-turned



Note - The head is to be concentric with the true longitudinal axis of the body within a limit of 0.025 inch.



SECTIONAL VIEWS OF BRITISH IS-FOUNDER SHRAPNEL SHELL



on an engine lathe built by the R. McDougall Co., Galt, Ont. The lathe is equipped with a short taper mandril instead of the usual chuck. The mandril has 3-taper steel bearing surfaces over which the shell is forced a sufficiently

its base a collar stop gauge for regulating the depth of cut at the base inside.

#### Rough Facing Base.

The next operation consists of rough turning the base of shell which up to

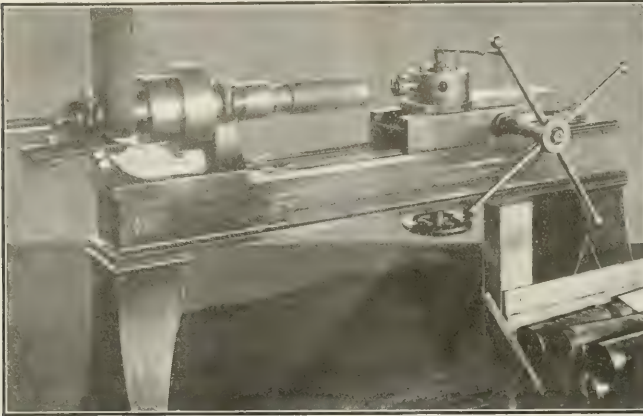
front, the cut thus being equally divided. Sufficient metal is left to form the centre already referred to. The shell is secured in a universal chuck while inside the hollow mandril is a fixed stop for locating it, the end of stop resting against the inside of base of shell.

#### Finish Facing Base.

At the next step, the base is finished except that the centre is left on. This work is performed on a turret lathe supplied by the A. R. Williams Machinery Co., Toronto. The shell is held in a two-jaw chuck and is set in the correct position by means of a bar in manner similar to the preceding operation. On the turret is mounted a fixture with three rollers for holding the base of shell, a broad cutter for facing up the base, and a smaller cutter at the side for rounding off the corners. A stop device under the turret regulates the feed.

#### Machining Driving Band Recess.

The copper driving band recess is now machined on an engine equipped with a "Bertram" waving and dovetailing attachment. The lathes were supplied by the Stevens Co., of Galt, Ont., and the A. R. Williams Machinery Co., Toronto. The nose end of shell is held in a universal chuck to which is attached a three-point cam for forming the wave. The centre on base of shell, which by the way has not as yet been



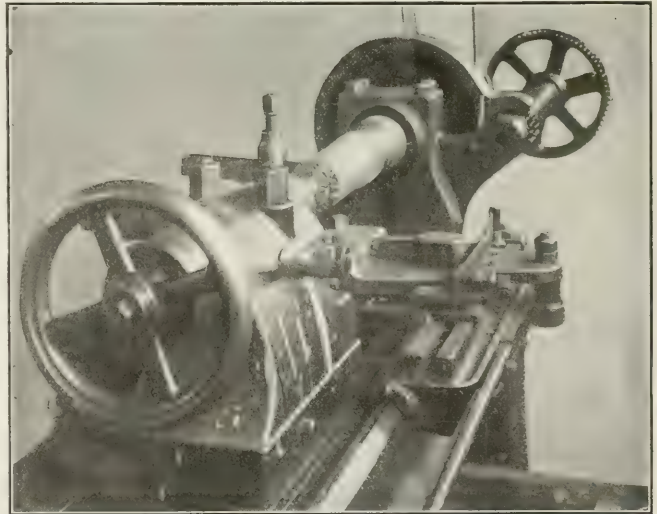
COUNTERSINKING CENTRE IN SHELL BASE.

tight fit, while the hollow centre at the base end engages with the tailstock centre. This arrangement permits of the entire length of shell body being machined. The bevel on outside of nose is taken care of by a cam device attached to the bed of lathe at the back. The cross slide has an extension with a roller at the end engaging with the cam, thus giving the required bevel and preparing the nose for the closing in operation at a later stage.

#### Rough and Finishing Boring Inside.

At the next operation the shell casing is rough bored and finished inside, also faced to length. A Walcott & Wood combination engine and turret lathe is used for this work, the lathe being fitted with an air chuck designed by the Electric Steel & Metals Co. of Welland, Ont. The air chuck is of the same type as fitted to the lathe for machining and threading the nose, and will be dealt with later, when that operation is being described. The turret holds four tools, the first being a boring bar with a cutter, and the second, a large drill. Both these tools are used for the same purpose, viz., to remove any scale that may be in the forging. The third turret face holds a bar with a cutter for rough boring the inside of the forging, the end of the cutter being shaped to conform to the profile of the inside of base. In the bar is an inserted cutter for facing the forging to length. The fourth tool is similar to the preceding one and is used for finishing the inside and base profile. The bar has at

this point has not been machined. In some plants this is usually the second operation. A cutting off machine built by John H. Hall & Sons, Brantford, Ont., is installed, and is equipped with back and front tool holders mounted



ROUGH TURNING OUTSIDE OF SHELL BODY.

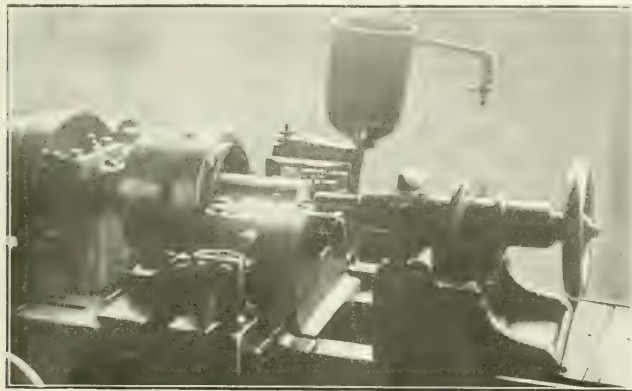
on separate cross slides, but operated by the same spindle, which is threaded right and left hand, so that both tools feed in towards the centre at the same time. The back tool is set ahead of the

cut off, engages with the tailstock centre. The front and back tool holders are mounted on separate cross slides, both being on a fixture fastened to the lathe bed. The front or waving tool

holder has in addition a slide to permit the necessary lateral motion. Fastened to the saddle are two brackets at the back and one at the front, each bracket having a cam on the inside for feeding the tools during the operation.

shells are next dipped in an oil bath, taken out and cooled. At this stage the degree of hardness indicated by a test on a "Shore" scleroscope is around 55.

The drawing of the grinding process now



GROOVING AND WAVING COPPER BAND RECESS.

The front tool holder contains a bar having at one end a roller and also the waving and grooving cutters. A strong spring on the outside holds the roller against the face of the cam. The dovetailing fixture at the back has two hook-nosed tools, left and right hand, secured in holders working in diagonal slides to form the undercut or dovetail. In operation, the tools being in position with the roller against the cam, the saddle travels in a direction away from the chuck, bringing the cams up to and at the back of the tool holders and forcing them in gradually, thus machining the groove to the required form and size. As regards the front tool holder, the cam presses on the lower part of the fixture, thereby leaving the tool holder free to oscillate while forming the wave lines and cutting the groove which is done by the same tool. This is the last machining operation previous to the heat treatment.

#### Heat Treating.

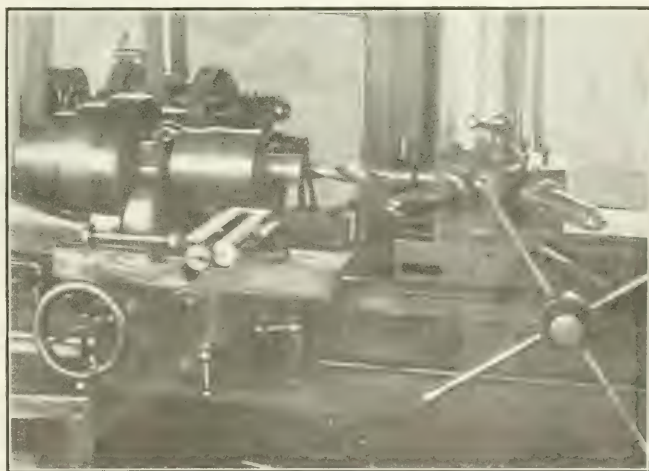
The important operation of heat treating now follows, in which the shell is brought to the required tensile strength. In this particular plant there are three distinct heatings. In the first place the shells are pre-heated in a gas furnace, constructed of brick and shown in the foreground in the illustration. The object of the pre-heating is to obviate the molten lead being cooled too much during the hardening process which follows. In the pre-heating furnace the shells are brought to a dull red and are then immersed for one minute in molten lead, the furnace temperature of which is at 1,575 degrees Fah. The

follows. The shells are put into another furnace also containing molten lead as a heating medium for 5 seconds, the temperature being 1,050 degrees Fahr. They are then taken out and allowed to cool gradually. The degree of hardness after tempering ranges between 41 and 45.

The furnaces are heated by natural gas, one being shown to the right of the pre-heating furnace, the others being behind. The oil quenching tanks

with a device for forcing air, from an adjacent compressor through the oil to keep it in motion and so to assist in the cooling process. Two electric pyrometers supplied by the Canadian Hoskins Co., Walkerville, Ont., are installed in this department for indicating the temperature of the various furnaces.

When cool the shells are arranged in lots of 120 in racks or boxes according to their series, a few of each lot being selected at random to undergo the test for hardness on a "Shore" scleroscope. Each shell has up to this point had a heat number stamped on, but after being tested they are identified by means of the series number; a record, however, is kept of the heat number. Before being tested, each shell is cleaned at the "set-up" point by means of a wire brush, in order to remove scale and have a clean surface for testing. A full description of the Shore scleroscope is unnecessary at this juncture, it being sufficient to say that a number of readings are taken, the shell being moved around on the carrying block between each test. A record is made of the average reading and one shell is selected from the series in order to provide a test piece which is cut at the set-up point. This is formed to suitable shape and is sent off to be tested by a government inspector who ascertains its tensile strength. The connection between the scleroscope readings and the tensile strength is that they bear a definite relation to each other, the degree of hardness being proportional to the tensile strength of the metal.



ROUGHING AND FINISHING INSIDE OF SHELL BODY AND FORMING OUTSIDE NOSE BEVEL.

#### Closing in the Nose.

are also on the right hand of the furnaces. The oil tanks have a water jacket to cool the oil and are equipped

The hydraulic press will be noticed on the right hand of the illustration.



This was built by Wm. R. Perrin & Co., Toronto, who also supplied the triplex pump and accumulator for operating it. The nose of the shell is first heated to a nice cherry red in a gas heated furnace containing lead, the latter being similar in construction to those already described. The diaphragm is dropped in and the shell is placed base down on a fixture attached to the table above the ram, the fixture having two vertical guides for keeping the shell central. When the pressure is applied, the ram rises and forces the nose of shell into the cone-shaped die in the casting above, thus closing it in to the correct size and profile. The press exerts a pressure of 1,000 pounds for this operation. The die is cooled from the water tank shown on top of the press. The shells are allowed to cool slowly and are then removed for the next machining operation.

#### Machining and Threading Nose.

This operation consists of facing the shell to length, reaming out preparatory to threading, finishing nose profile outside and inside, and threading the nose. A number of engine lathes built by the London Machine Tool Co., of Hamilton, Ont., are employed for this operation, each lathe having a turret mounted on the saddle and being tooled up to suit the work. An interesting feature to be noted is the air chuck which was specially designed for this class of work. The chuck proper consists of a circular casting or hood bolted to the driving plate and contains three jaws inside for holding the shell. At the back of the jaw is a plunger operated by a

ing placed in the chuck, and the air admitted to the cylinder, the plunger forces the jaws forward, grasping the shell securely.

The first turret face holds a reamer with a stop bar projecting in the centre

gauges used in this operation are shown on the lathe saddle in the illustration.

#### Finishing Outside Body.

Alternative methods are used for this operation, the shells either being turned



BANDING AND NOSING PRESSES AND ACCUMULATOR.

to give the correct length to the shell when the small cutter at the side of the reamer is in operation. The reamer prepares the nose for threading. At the second turret face is a bar with a broad curved cutter for making the finishing cut to the nose profile outside. The third turret face holds a bar with a similar cutter, but curved to suit the inside profile of nose. This cutter cleans up the inside of nose profile at the back of the part to be threaded. A "Murchey" collapsible die is mounted

on an engine lathe or finished on a grinder. For the first mentioned method an engine lathe built by the F. E. Reed Co., Worcester, Mass., is used. There is no cam attachment used in this case as it will be remembered that the nose profile has already been finished, thus the straight part of the shell body only requires machining or grinding as the case may be.

For the machining operation a plug centre is screwed into the nose of the shell and placed on the live or headstock centre of lathe, the base centre engaging with the tailstock centre. One light cut is only necessary to finish machining the body of shell, and this is done by an ordinary turning tool.

For the grinding operation a 10 x 24 in. plain grinder built by the Landis Machine Co., Waynesboro, Pa., is used. As in the preceding case the straight part of the shell only is finished and a "Hart" emery wheel is used for the purpose. The grinder is belt driven from a motor located on the floor at the back of the machine, a satisfactory arrangement considering the nature of the work. For grinding the shell, the same type of centre is used for the nose end as for the machining operation. The base end of shell is carried in a cup centre. About 1-32 in. only is removed when grinding.

#### Pressing on Driving Band.

It will be noticed in the illustration that there are two banding presses. The press in the foreground was built by the Goldie-McCulloch Co., Galt, Ont., and is for the 18 pound shells. The press immediately behind is for the 15 pounder shrapnel shells and was built by the Canadian Fairbanks-Morse Co.,



HEAT TREATING DEPARTMENT SHOWING FURNACES, ALSO BANDING AND NOSING PRESSES IN BACKGROUND.

spindle inside the headstock and connected to the air cylinder at the extreme left hand of the latter. The shell be-

on the fourth turret face for threading the nose. This operation completes machining on the inside of shell. The

Toronto. They are both very similar in construction, each having six hydraulic cylinders with rams converging towards the centre at the end of which are steel dies conforming to the shape of the rough copper band. Both presses are operated from one pump and accumulator built by Wm. R. Perrin & Co., Toronto. The pump is located behind the accumulator and the press will be seen to the right in the illustration.

The method of operation is the same for both presses. The copper band is slipped over the base into the recess, the shell being then placed on a plate in the centre of the press. The operator moves a lever and the rams squeeze the copper band into the recess. The pressure is now taken off and the shell given a slight turn, after which the operation is repeated, thus equalizing the pressure on the band. The copper band now completely fills the recess and the shells are removed to have the bands turned.

#### Turning Copper Bands.

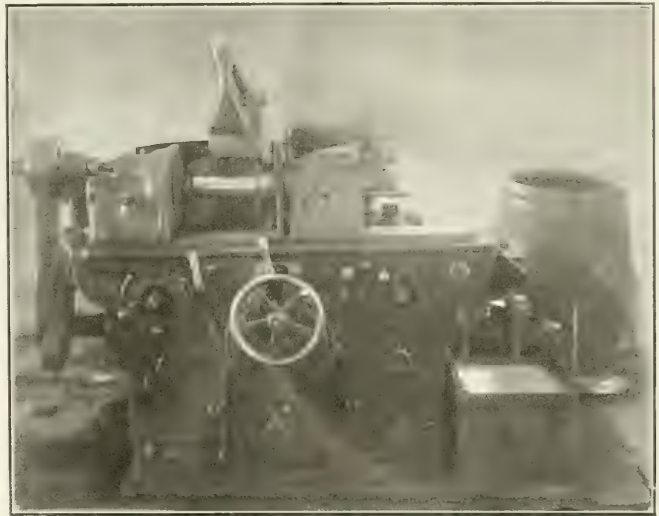
The copper bands are turned on a machine built by the Jenckes Machine Co., Sherbrooke, Que. This is equipped with a universal chuck mounted on the headstock spindle which is driven by friction clutch pulley controlled by a lever within reach of the operator. On the bed of the machine is clamped a saddle which carries the front and back tool slides.

The shell is placed in the chuck and is located in the correct position, by a sliding finger pivoted on the front tool

fixed saddle. The tool is fed in by a hand wheel to a dead stop. The front tool holder is provided with a hinged scraper rest for removing the

#### Removing Centre and Marking.

The centre projecting from the base has up to this stage been retained and used in the various machining opera-



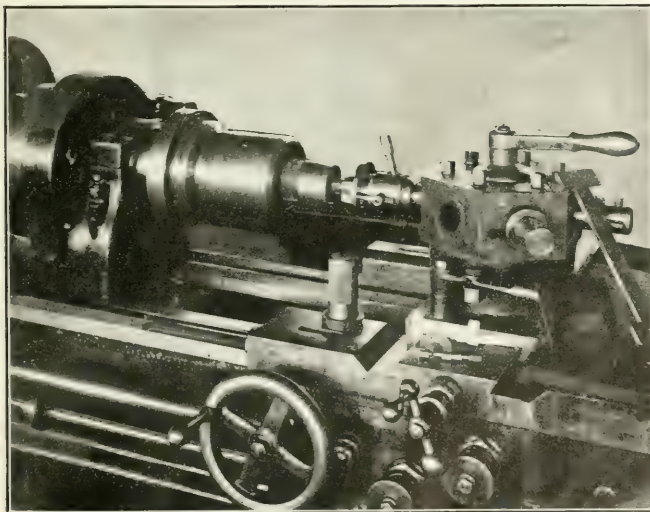
"LANDIS" GRINDER FINISHING SHELL BODY.

ragged edge at each side of band after tooling. The rear or finishing tool is held in a steel block working in a slide on a fixture on the saddle at the back. The tool is mounted above the work, but can be adjusted to pass down behind

tions, this method being adopted, as already stated, in order to obtain a shell as concentric as possible, for by always working from the same centre, this can more easily be accomplished. As there are now no more machining operations on the shell proper, the centre is cut off. This operation is done on a lathe supplied by the London Machine Co., Hamilton, Ont. The shell is now ready for marking, and for this operation is taken to a bench where the various markings are stamped on by hand.

#### Filling and Assembling Shells.

The shells go next to the assembling department where the various parts are put together and the bullets and resin poured in. The tin powder cup is first slipped past the diaphragm into the powder pocket, and the brass fuse tube screwed into the diaphragm. For pouring in the bullets, a wooden structure has been devised, this consisting of a bin containing the bullets situated above the operator and supported on a frame. The bullets fall down a spout into a receptacle which tilts when it contains the approximate total number, the latter pouring into the shell which has been placed underneath. To help the bullets to consolidate in the shell an air jarring apparatus is used which vibrates the shell while the bullets are being poured in. The shells are now taken over to a resin kettle where hot resin is poured in to form a matrix for the bullets. Immediately afterwards the shell is weighed



FINISHING AND THREADING NOSE INSIDE. FORMING NOSE PROFILE OUTSIDE.

block, before the chuck is tightened. The front or roughing tool is held in a holder working on a cross slide on the

the work, and in passing shave the band to size. The feed on the back tool is controlled by a lever and pinion.



and the weight adjusted within the prescribed limits. In order to obtain the correct weight, it may be necessary to add a few buckshot or take out a little resin. The brass socket is next screwed into the nose, and the fuse tube soldered in the hole in the socket.

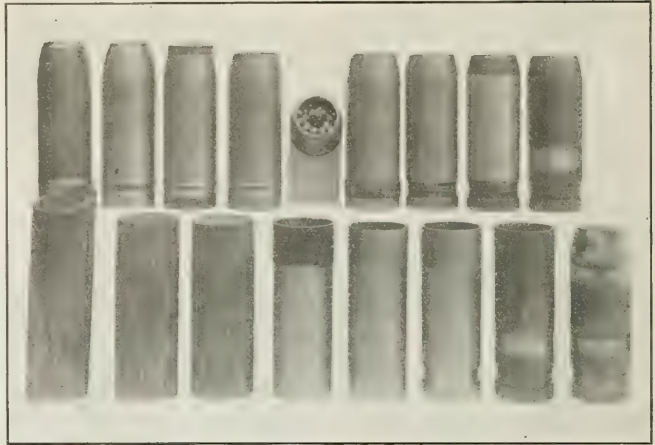
#### Finishing Sockets.

When the brass sockets are received at the plant they are already machined and threaded except for that part outside which forms the fuse plug seat. A "Bertram" engine lathe with turret attachment is employed for machining this. The shell is chucked, and the outside of the socket rough turned, the bar with cutter held in the second turret forming the fuse plug seat on the outside of the socket. The third tool faces up the bottom of the socket at the same time, removing that part of the fuse tube which projects after soldering. The brass socket is now hand tapped, and the shells cleaned and weighed so as to be ready for the final Government inspection. During this they are carefully

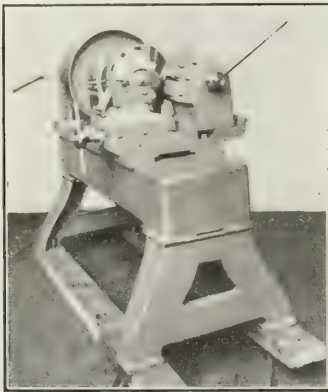
floor are arranged in their series, the packing cases being seen at the left.

No particular reference has been made

space; simplicity of control; smaller amount of heat lost to the surrounding atmosphere; and cleanliness of sur-



SHELLS IN VARIOUS STAGES OF MANUFACTURE AFTER WHICH THEY ARE READY TO BE MADE IN "FIXED AMMUNITION."



JENCKES MACHINE CO. BAND TURNING LATHE.

weighed and gauged, and one selected out of each series for the firing test. Before being taken to the painting department, a brass plug is screwed into the nose. These plugs, as in the case of the sockets, are made outside, and do not require any further machining.

#### Painting.

The accompanying illustration shows the painting and shipping room. The painting machine is a portable outfit, and consists generally of a motor which drives three cup-shaped shell holders located on the top of the table. The motor is situated below, as shown. The priming coat is of course grey, the finishing coat black, and the nose red; the paint is applied by hand. It will be noticed in the illustration that the shells on the

to the gauging feature which plays a most important part in the manufacture of any type of shell. The gauges used are standard, and are as used in most plants making shells. At each operation the shells are carefully checked with high and low gauges, and, in addition, inspectors specially appointed examine each shell at certain stages of manufacture.



#### ELECTRIC FURNACES.

THE principal advantages to be derived from the use of electric furnaces in preference to combustion furnaces for reheating in steel works are summarized by T. F. Bailey as follows:—"More accurate temperature control; non-oxidizing atmosphere; saving in space; elimination of blast and stack; uniformity of temperature throughout the heating

roundings. The smaller amount of heat lost to the surrounding atmosphere makes the work around an electric furnace far more healthy and agreeable than with the combustion furnace."

For furnace temperatures not exceeding 2,500 deg. Fahr., the electric furnace will answer any reasonable requirements, and so far as the actual fuel cost alone is concerned, at the rate of one cent per Kilowatt-hour, will compare favorably with oil furnaces burning oil at four cents per gallon.



The modern idea seems to be that as such a large part of our life is spent in the occupation of business, it ought to be one of pleasant relations and enjoyable conditions. These are possible only as justice, good feeling and honesty prevail.



PAINTING DEPARTMENT AND SHIPPING ROOM.

# The Design and Constructional Features of Plug Gauges--II.

By C. Hattenberger

*The application and maintenance of proper plug gauges for certain lines of manufacture mean greater efficiency and interchangeability. Where a large number of similar pieces are required, suitable gauges are most essential, and should be provided.*

## ADJUSTABLE PLUG GAUGE.

**F**LAT gauges are frequently employed because of their light weight. In some cases they are the only gauges that can be used at all, because cylindrical gauges of the same size would be too cumbersome. Fig. 23 shows an adjustable gauge. The frame (A) is an aluminum casting, having holes drilled to receive the screws for holding the hardened measuring blocks (B). When the gauge shows wear, it is only necessary to disassemble and reduce the thickness of the shims (C), after which it can again be assembled and ground to size on centres provided for the purpose in the frame.

Fig. 24 shows an inexpensive form of flat plug gauge limit type of go and not go ends and exact size in the centre.

A plug gauge that can be used without drawing the boring bar from the hole is

shown in Fig. 25. The illustration, the writer believes, is self-explanatory.

## Ball Race Gauges.

Fig. 26 shows a gauge used for gauging ball races. It consists of the following: A sliding plug (A), having the proper limits; these, for obvious reasons, are shown exaggerated in the illustration. The spider (B) is milled and drilled to receive the oscillating fingers (C). These are held against the plug by means of helical springs shown. The measuring points (D) are lapped to the proper length and radius, and should be a tight fit in part A. A small stud (E) governs the movement of the sliding plug.

Another form of ball race gauge is shown in Fig. 27. This also works on the principle of a sliding plug. The measuring points in this case are two steel balls. A tubular cage (B) and two

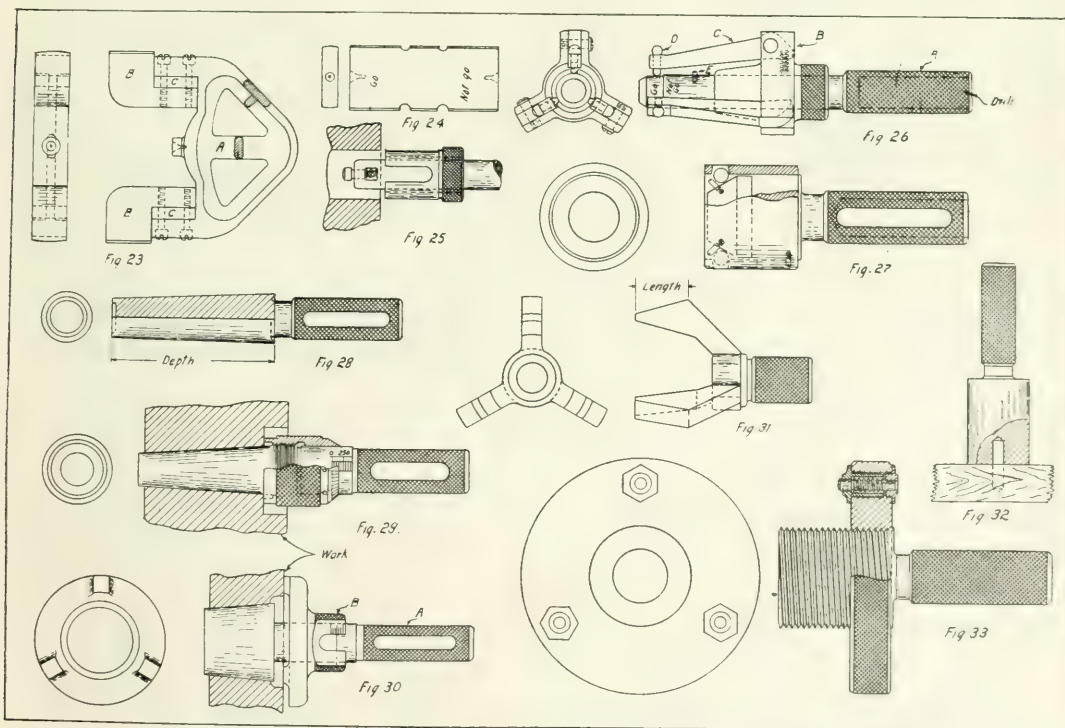
studs keep the balls from dropping out of place.

The gauge in Fig. 28 is the type commonly used for gauging taper holes; the large end shows the depth to which the gauge should enter.

## Accurate Taper Gauge.

Where a very high degree of accuracy is required, a gauge similar in construction to that illustrated in Fig. 29 will answer the purpose. It operates on the micrometer principle. The graduations read to a thousandth part of an inch.

Fig. 30 is also an indicating gauge, but not so well adapted for accurate work. To the plug A is fitted a movable ring (B). A flat is milled on B. On this are marked the graduations. A zero line is inscribed on the circumference of the straight portion of the plug. Attention is called to the three bosses on the ring (B). These must be ground at right angles to the axis of the hole.



DESIGN AND CONSTRUCTIONAL FEATURES OF PLUG GAUGES



The type of gauge shown in Fig. 31 is for measuring the relation of a taper to a shoulder or bottom of a blind hole. When the ends and circumferences of the three fingers are all in contact with the work, there will be no perceptible shake of the gauge in the hole.

#### Protecting Plug Gauges.

Referring to the illustration, Fig. 32, it will be seen that a hole is drilled in the end of a plug gauge. This is done to allow the gauge to be placed over a pin inserted in a shelf used for holding the plug gauges. It can readily be seen that gauges so arranged are kept from shifting about, and are protected from injury.

#### Thread Testing Gauge.

In Fig. 33 is shown a flush pin gauge

of various shapes are needed to check results. Some, if made in the usual manner—that is, made solid, would be too costly. A built-up gauge shown in Fig. 34 is used for gauging three keyways spaced 120 degrees apart.

#### Duplex Gauge.

Fig. 35 illustrates a type of checking gauge for gauging the diameter of two holes. It also serves to gauge their centre distance or relation to each other.

#### Multiple Gauge.

Fig. 36 shows how two bores and three faces are measured by means of a single gauge. The flanged bushing (A) is hardened and is ground on the diameter and the inner face of the flange. It measures the centre hole in the work. The steel blocks, B and C gauge the

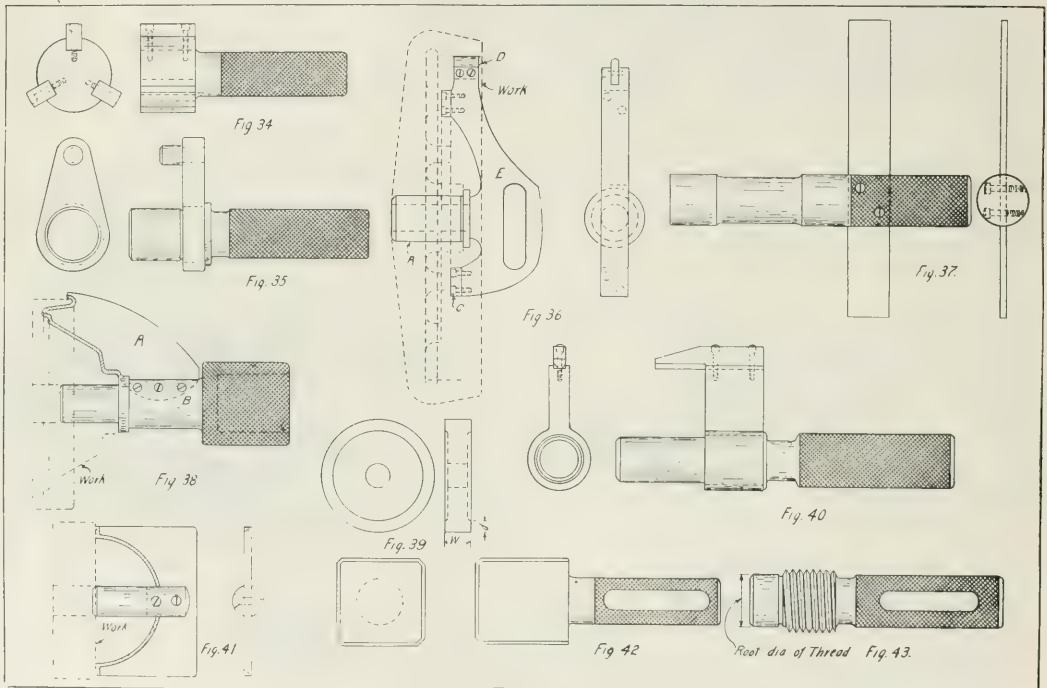
#### Profile Gauge.

Fig. 38 shows a form of checking gauge used for gauging the profile of the work with its relation to the hole. The profile templet A is made of Ketos non-warping tool steel. A slot or kerf is milled in plug B to receive this templet. It is secured by means of three screws shown.

The gauge illustrated in Fig. 39 is not a plug gauge, but is well adapted for gauging the ring grooves in pistons and work of like character. The dimension W represents the width and (d) the depth of the groove.

#### Combination Gauge.

Fig. 40 is a combination of plug and snap gauge. It is used to advantage where a hole and outside diameter are to



DESIGN AND CONSTRUCTIONAL FEATURES OF PLUG GAUGES.

used in connection with a thread plug gauge. It is used to determine if a machined face is at right angles to the axis of a threaded hole. The plug is screwed into the hole for about two-thirds of its length. The ring containing three flush pin gauges is then brought forward against the machined face and the relative position of the flush pins noted.

#### Keyway Gauge.

Because of the large amount of work done on the broaching machine, gauges

depth of the two faces from the flange. The part D gauges the large bore. All parts are fitted to the frame E after hardening, and ground on centres provided for the purpose.

#### Inspection Gauge.

Fig. 37 is a gauge used in the inspection room for gauging the diameter of a wrist pin hole in a piston. A straight edge is provided for determining if the hole is at right angles to the diameter of the piston.

be gauged. This form of gauge should only be used when the limits on the outside diameter are not very close.

Fig. 41 is another plug profile gauge of almost similar construction as that described in Fig. 38.

Fig. 42 is a plug gauge for square holes.

#### Reference Gauge.

Fig. 43 is a standard reference gauge, and is only used in the tool-room for comparing with the shop gauges. They should not be hardened.

## Grinding Wheels: Their Material and Manufacture

*The adoption of grinding as a commercial operation in machine shops has been very marked in connection with shell making. While most users are familiar with the suitability of different abrasives for certain classes of work, the principal features regarding the manufacture of grinding wheels have always remained more or less unknown.*

**G**RINDING as a means of removing metal has been brought to a state of such perfection and applied to such a broad field of manufacture that grinding machines excite no more comment than engine lathes or other manufacturing tools. The great advances made in the production of high-speed steel have monopolized the attention of manufacturers to so great an extent that the degree of perfection attained by the makers of grinding wheels has not been proportionately recognized.

The subject of grinding has received considerable attention from Mr. John Davey, of Glasgow, who recently read a paper before the Keighley Association of Engineers. The subject of materials and processes involved in the successful production of grinding wheels is treated by him in a most interesting way, and the information conveyed is certain to be appreciated by many users of abrasive products.

### Abrasives: Natural and Artificial.

The principal natural abrasives are emery and corundum. The artificial abrasives are becoming increasingly numerous, and include carbolite, carborundum, crystolon, and alundum. These substances are all products of the electric furnace.

#### Emery.

Emery is simply corundum with a number of impurities present, which frequently accompany it in its natural state. Several years ago practically all grinding wheels were made from emery obtained from the vicinity of Smyrna and Chester, Mass., U.S.A. The value of emery as an abrasive depends upon the proportion of crystalline alumina oxide which it contains. This is the only element in emery which is hard enough to have any appreciable cutting action on metals.

#### Corundum.

Pure corundum was adopted in preference to emery. Harder, the grains held their sharp points longer, while the absence of impurities, which caused increased friction without removing any metal, reduced the heat generated, thus allowing output to be increased.

Corundum has been obtained in India, and also in the States of Georgia and North Carolina, but nearly always in small deposits of varying quality. It would contain crystalline alumina to about 77 per cent. Due to its superiority

over emery, it was eagerly sought after by the makers of grinding wheels. The supply from the sources mentioned was limited and uncertain, so that it did not come into general use until the discovery in 1896 of the now well-known Canadian mines. Not only do their deposits contain an unlimited supply of corundum, but the quality is far superior to any previously mined. It is found to contain 90 per cent. crystalline alumina and will often analyse much higher. Sharpness combined with just the right temper, has made Canadian corundum an ideal abrasive for most kinds of grinding. The Canadian corundum is mined in Eastern Ontario, the known deposits covering an area of about 32 miles long and 5 miles wide.

#### Carborundum.

Carbolite, carborundum and crystolon are different formations of the same substance; i.e., carbide of silicon.

Carborundum is distinct from anything found in nature. It is the product of the electric furnace, and being under human control, its freedom from impurities is assured. Carborundum is the trade name for carbide of silicon. It is the crystalline formation of the elements of carbon and silicon, brought about by subjecting a mixture of coke and sand to the inconceivable heat of 7,000° Fahr. The mixture is placed in the electric furnace, a fire brick structure 50 ft. long by 8 ft. wide, through which is built a core or resistance path. Leading to the core are the carbon rods attached to a set of power electric cables. To the mixture of sand and coke is added a quantity of sawdust which makes the mixture porous, so as to allow for the free escape-ment of gases which are found during the operation. When the furnace has been filled the electric current is turned on and travels along the core, generating a heat that really is beyond human comprehension. It is a temperature at which steel, marble, granite or the highest refractory substances would not only melt, but would vaporize. In this tremendous heat the element of carbon and the element of silicon fly together and form crystal masses of the most beautiful hues. It takes 36 hours for the crystal to form. At the end of 36 hours the outer crusts of the mixture are broken into, the crystal masses removed and taken to the crushing department. The grains are then carefully washed free

from dirt, dried and separated into the different sizes of grains.

Carborundum is particularly suited for foundry work and grinding cast iron in the cylindrical and surface grinding machines.

#### Alundum.

Alundum is oxide of alumina in crystalline formation. It is made by fusing the mineral bauxite to an intense heat in the electric furnace by the arc process. Chemically, bauxite is the purest form of aluminum oxide found in nature. The best bauxite mines are those found in the southern part of U.S.A., and only the best from these mines are used in the manufacture of alundum. Bauxite was considered infusible until the invention of the alundum electric furnace.

The furnaces used for the manufacture of alundum are different from the electric furnace used for the making of carborundum. They are conical-shaped pots, which stand on a ear, and are heated by two vertical electrodes, which are gradually raised as the molten bauxite fills the furnace. The bauxite, as it is prepared for the furnace, is in the form of coarse gravel, that is, the bauxite as it comes from the mine is in a wet, clayey state. It is dried by means of a rotary calciner. The cylinder of this machine is 60 ft. in length, and is heated by two gas producers, the material being fed in at the farthest from the fire. Platforms are erected upon which the dried bauxite is placed, and it is fed into the electric furnace through the top.

Alundum is very suitable for use in the cylindrical and surface grinding machines for grinding hardened and soft steel, brass, bronze, etc.; in fact, it covers the same field as corundum.

Three distinct processes are now widely employed for binding together abrasive grains to make grinding wheels. These are the vitrified, silicate and elastic, and each produces wheels specially suited for certain kinds of grinding.

#### Vitrified Process.

More grinding wheels are made by the vitrified process than any other. It consists in mixing suitable clays and fluxes in certain proportions with the grains of abrasive. This is generally done by the wet process, when a large amount of water is added and the mixture stirred in mixing kettles, until it is quite fluid. In preparing the mixture before the water is added, great care is taken to get the correct proportion of abrasive and the different clays, and in the case of combination wheels, where different size grains are used, the same precaution is used, so that wheels can be duplicated at any time. If an order is passed into the works for a wheel of a certain grit and grade it is made to the standard



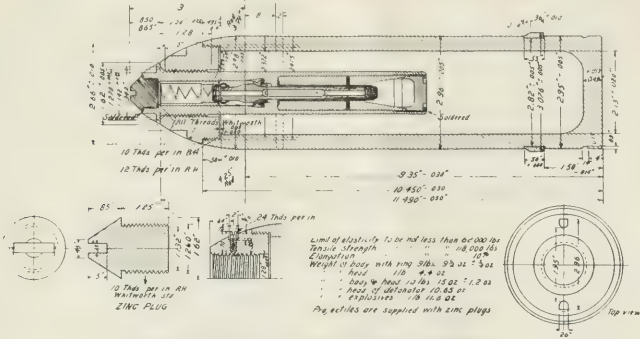
formula. Some years ago a great deal of trouble was caused by the wheels varying, but by the use of improved methods and care in weighing out the correct proportions of abrasives and clays this has been reduced to a minimum.

After the mixing, the mixture is drawn off into moulds and dried in drying

skill, and the uniformity and balance of the wheels depend largely upon the skill of the moulder. The wheels are then dried and afterwards baked in special ovens, from which all fire gases are carefully excluded. This causes a chemical reaction, which hardens or sets the bond, and after sufficient cooling, the wheels

under hydraulic pressure or rammed into moulds the same as silicate wheels. They are then baked at a low temperature to set the shellac. By the elastic process very thin wheels may be made and used with safety. Wheels as thin as 1/32 inch are procurable, and are very useful for cutting of small bars of high-speed steel. Wheels made by this process can be supplied in a few days. All wheels require to be more or less finished after the baking or burning process. This work is done in special lathes, using a circular steel cutter and other types of wheel dressers. After finishing, the wheel is mounted on balancing ways. If not in balance, it is made so. It is then revolved at a speed 60 per cent. in excess of its working speed, producing a stress more than twice as great as that developed in use.

The wheels are tested for hardness by using a sharp-pointed instrument and comparing them with master discs that are kept as standards.



RUSSIAN 15 PDR. HIGH EXPLOSIVE SHELL.

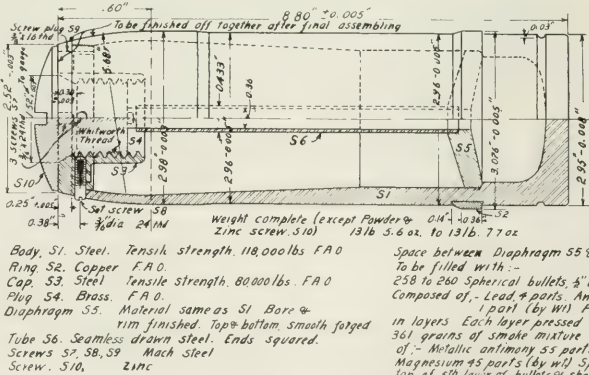
rooms until it is hard enough to be handled. The wheels are moulded larger than the size wanted, and are shaved off on a machine resembling a potter's wheel. The hole is also put into the wheel on the machine while the wheel is in its semi-finished state. The next process is placing the wheel in the kiln. The kilns vary in size, some containing a chamber 18 ft. in diameter and 8 ft. high. The wheels are placed on fire-brick tiles, then surrounded by fire-clay rings, until the stand is complete. The kiln will hold several hundred wheels. The period of burning varies according to the size of kiln. In the larger kilns it takes nearly three weeks from the time the kiln is charged until it is drawn. During the baking or burning process the temperature is gradually raised until it is hot enough to vitrify or partially melt the clay, about 3,000° Fahr. The utmost skill and care are required to successfully burn a kiln, and every possible device is used to bring the operation under perfect control. If the temperature is allowed to change too quickly the wheels will be cracked. If they receive too much heat they will be harder than intended, and if not enough they will come out too soft. Wheels made by the vitrified process are those mostly in use on cylindrical and surface grinding machines, as they are free cutting,

are ready to go to the finishing room. Some shapes of silicate wheels are moulded under hydraulic pressure, as, for instance, dish wheels, and all very hard silicate wheels are so moulded.

Water glass is the principal ingredient in the bond of silicate wheels, but other substances have to be added. Wheels made by this process are used for cutter sharpening, tool grinding, such as lathe and planer tools, etc. They can be furnished in a few days, and can be made up to 60 inches diameter or more, which is not possible in the vitrified process.

H. L. Gantt says scientific management will reduce costs, or, what is its equivalent, the time and effort necessary to do a certain amount of work, but it will not solve the labor problem; it will not in the long run tend to raise wages or increase profits. Scientific management is suffering more from the fact that too great claims are being made for it than from anything else. Far more fundamental reforms are necessary.

When opening up any steam line, take the following precautions:—(1)—Open



RUSSIAN 15 PDR. SHRAPNEL SHELL WITHOUT FUSE NOSE.

Silicate Process.

Silicate of soda or water glass is the principal ingredient in the bond of these wheels. After it has been thoroughly incorporated with the abrasive grains in special mixing machines, the whole mass has a thick adhesive quality. In this condition it is rammed into moulds. This part of the work requires considerable

Elastic Wheels.

Shellac is the principal ingredient of the bond of elastic wheels. After the mixture has been suitably prepared, its consistency is such that if thin wheels are wanted it may be rolled into shallow moulds. Thicker wheels are moulded

all available drips. (2)—Warm the line by opening the stop valve sufficiently to warm slowly. (3)—Never allow an inexperienced man to turn steam into a cold line. (4)—Never open the main valve until certain that the line is thoroughly heated.

## Principles of Laying-Off Cylindrical Intersections---II.

By J. W. Ross

The more or less special nature of the work involved in the making of sheet metal piping has caused many manufacturers to avoid this class of work, with the result that when a job has to be handled, there is frequently considerable unnecessary loss incurred through errors in laying off material. The examples treated by the writer of this article should form a valuable reference to many manufacturers on ordinary as well as special occasions.

### HEAVY PLATE TEE.

FIG. 1 shows in perspective a Tee which it is proposed to develop in heavy plate. The front and side elevations are shown in Figs. 18 and 19 respectively. The measurements will be given in feet, the student reducing the dimensions to any desirable scale.

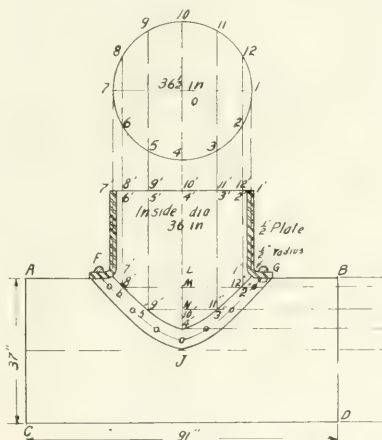
**Construction.**

Measure off C D Fig. 18 equal to 91 inches. Draw the lines A C and B D at right angles to C D, and equal in length to the outside dia. of the pipe which is 37 inches. Draw the line A B parallel and equal in length to C D. C A B D shows the side elevation of the horizontal cylinder.

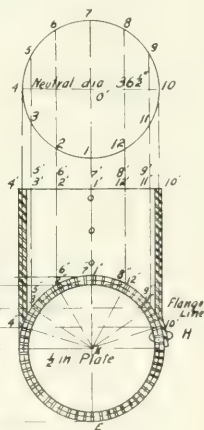
Bisect A B at L, and raise the perpendicular J L 10. Measure off L O' equal to 22 inches. Through and with 10' as centre, draw the line 7', 10', 1', at right angles to the line L O', and equal in length to the neutral diameter of the pipe which is  $36\frac{1}{2}$  inches. Project the points 7' and 1' down at right angles to A B, locating the points 7<sup>2</sup> and 1<sup>2</sup> respectively. Connect these points which will show the neutral outline of the vertical pipe. Build around the neutral lines 7', 7<sup>2</sup>, 1', 1<sup>2</sup>, the cross section of the plate thickness. With O as centre describe the neutral plan view of the vertical cylinder. Divide this circle into a suitable number of equal spaces. This number to be at least divisible by four as was previously explained to show lines on each quarter of the circle. The greater the number of spaces the more accurate the developments. To save confusion of the lines in such a small drawing the number 12 has been chosen. Project all these points, parallel to 10. J, and down through A B, indefinitely. Now construct the end elevation view. Draw the centre line 7. E, Fig. 19 parallel to the centre line 10. J, Fig. 18. Project the line A B, Fig. 18 over to its intersection of the centre line 7 E, Fig. 19, thus locating the point 7<sup>2</sup>. Locate the point E by projecting the line C D Fig. 18 over to the centre line 7 E, Fig. 19. With centre K and radius K E describe the circle representing the end view of the outside circumference of the horizontal cylinder A B D C. Project the line 7<sup>2</sup>

10° 1', Fig. 18 over to 4°, 1°, 10°, Fig. 19. With centre O' and radius equal to half the neutral diameter of the vertical pipe draw the circle 1, 4, 7, 10. Divide into 12 equal parts. This plan is shown as a quarter turn to that of the plan view in Fig. 18. Therefore number accordingly. From all these located points drop projectors—parallel to 7 E—to the intersection of the horizontal end view. Number all these intersections in relation to the plan view. With K as centre, draw in the neutral circle line and thickness of the plate for the horizontal cylinder. Also build up the plate thickness around the neutral lines 4° 4' and 10° 10'. Horizontally project the points 1°, 2°, 3°, 4°, etc., Fig. 19, to their intersections of the similarly numbered vertical projection lines in Fig. 18. In this manner locating the mitre points by the points 1°, 2°, 3°, 4°, 5°, 6°, etc., Fig. 18. Connect these points by an even curve thus defining the mitre line. With

3.14 which is 114.61 inches or nearly 114 $\frac{5}{8}$  inches. Measure off 1', 7', 1' Fig. 20 equal to 114 $\frac{5}{8}$  inches. Divide into 12 equal spaces. Project these points downwards. Number with the object in view of having the vertical rivet seam on the lines 1', 1'—1', 1'. Now set the dividers to the distance 1', 1 $\frac{1}{2}$  and 7', 7'. Fig. 19. Transfer this over to this numbered element lines in Fig. 20. Proceed in a similar manner by transferring the distances 2', 2', 3', 3', 4', 4', Fig. 19 to their respective locations in Fig. 20. In transferring these measurements ignore the flanges at F and G, Fig. 18, and H, Fig. 19. The reason for this is as follows:—4', 4', Fig. 19, is drawn without the flanges, the neutral line striking the circle as shown at 4'. On the line 10' 10' the flange is shown, and the neutral line is drawn in its correct relation to the plate thickness. To transfer 10' 10' take the measurement as was done for 4' 4'. Draw an even curve through these



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$\frac{3}{4}$  inch radius draw in the neutral line as at the points 1<sup>a</sup> and 7<sup>a</sup>, Fig. 18. With  $\frac{1}{2}$  inch and 1 inch radii draw the cross sectional plate thickness. Draw in the laps. Locate the laps as F and G, Fig. 18. Similarly draw in the flange, rivet, and lap allowances as shown by H in Fig. 19. Now proceed to develop the vertical pipe.

The neutral diameter equals  $36\frac{1}{2}$  inches. The stretchout equals  $36\frac{1}{2}$  .

located points on Fig. 20. This is shown drawn with short dash lines. This line would be the flange line in light plate. In heavy plate this line will change according to the thickness of the plate used. The plate thickness in the drawings Fig. 18 and 19 is somewhat exaggerated for explanatory purposes. Again to show it more clearly, the section of plate on the line 1', 2', Fig. 18, is enlarged in Fig. 21. In Fig. 21 the inside

\*Note: The reference letters and numerals in the text, i.e., G<sup>2</sup>, 7<sup>2</sup>, etc., correspond with those of the illustrations indicated as G<sup>2</sup>, 7<sup>2</sup>, etc.



radius of the bend is  $1\frac{1}{2}$ , therefore the neutral radius will be  $3\frac{1}{4}$  inches. R locates the centre for this radius and P and S the extremities of the quadrant. Bisect this quadrant at Q, thus locating the centre of the flange. Measure carefully along the neutral line the straight as well as the curve from  $1^1$  to Q. Take this distance and transfer it over to the line  $1^1 1^2$  Fig. 20, to locate the point Q, for the flange line of the templet. Again measure from Q to the centre of the rivet, and also from the rivet centre to the edge of the lap Fig. 21 transfer this also to the rivet line  $1^1 1^2$  Fig. 20 to locate the rivet line on the flange and the lap edge. These dimensions may be calculated. The neutral radius R, P, multiplied by 1.57 will give exactly the length of the neutral quadrant P Q S. R P equals  $3\frac{1}{4}$  inch, and  $3\frac{1}{4} \times 1.57$ , equals slightly over  $1\frac{1}{8}$  inches, which is the length of the neutral quadrant P Q S. Now  $1^1$  P equals 22 inches minus the  $\frac{1}{2}$  inch for radius and the  $\frac{1}{2}$  inch for plate thickness, which equals 21 inches. P Q equals  $\frac{1}{2}$  of P Q S — 9-16 inches. Therefore  $1^1$  P, plus P Q, equals 21-9-16 inches. This dimension being equal to  $1^1$  Q in Fig. 20. Also Q S which equals 9-16, plus  $1\frac{1}{4}$  inches to the rivet centre, plus  $1\frac{1}{4}$  inches to the edge of the lap equals 3-1-16 inches total.

Q G, Fig. 21 therefore equals 3-1-16 inches. Measure off  $7^1$  Q G equal to  $1^1$  Q G Fig. 20. Refer back to Fig. 19. Measure along the neutral line the distance from  $10^1$  to the flange line Q and from Q to the rivet centre, and from the rivet centre to the lap edge, transfer these measurements to Fig. 20 on the lines  $4^1$  Q H and  $10^1$  Q H. With the five points Q located, draw in the flange in relation to the mitre line also draw in the rivet line and lap edge. Space off the rivet centres into a suitable number of equal spaces. One of the corners is scarfed, that is, thinned down, to permit of a close fitting joint at this point when the plate is rolled and fitted into position. As was stated before it is not the usual practice to put the holes in this templet. These holes being marked off when fitted on the rolled up horizontal cylinder.

The opening and the rivet holes will now be marked off in the cylinder as shown in Fig. 22. Calculate the stretch-out of the horizontal cylinder of which the neutral diameter equals  $36\frac{1}{2}$ . The stretchout equals  $36\frac{1}{2} \times 3.14$  which is nearly 114 $\frac{5}{8}$  inches. Measure off D B D Fig. 22 equal to 114  $\frac{5}{8}$  inches. Bisect to locate B, erect the perpendiculars B A, D C and D C equal in length to that of D C Fig. 18. Draw the line C A C parallel to D B D. Draw radial lines from the points  $1^2$ ,  $2^2$ ,  $3^2$ ,  $4^2$ ,  $12^2$ , etc., Fig. 19, to the centre K. Note where these radial lines intersect the neutral line of the

cylinder of which K is centre. Transfer all these distances from these points measured along the neutral line as  $1^2$  to  $2^2$ ,  $2^2$  to  $3^2$ , etc., Fig. 19, to the distances  $1^2$ ,  $2^2$ ,  $2^2$ ,  $3^2$ , etc., on the line C A C, Fig. 22. Through these points Fig. 22 draw

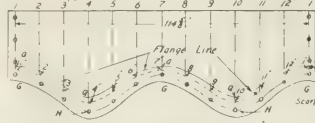


FIG. 20.

lines parallel to the centre line A B. Number these points and lines corresponding to the points from which they were transferred. Bisect C D at J and draw in the horizontal centre line J J. Locate L Fig. 22 at the intersection of J J with  $1^2 7^2$ . Locate M at the intersection  $2^2 6^2$  and  $12^2 8^2$ . Similarly locate N. Take the distance L to  $1^2$  on the mitre line Fig. 18, transfer this to L,  $1^1$  Fig. 22. Again

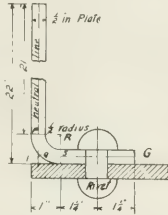


FIG. 21.

take the distance M  $12^2$  Fig. 18, and transfer over to M,  $12^2$ , Fig. 22. Similarly transfer the remaining distances N,  $11^2$ , N  $3^2$ , L  $7^2$ , etc., from Fig. 18 to their respective positions as N,  $11^2$ , N  $3^2$ , L  $7^2$ , etc., Fig. 22. Connect all these points with a fair curve thus locating the outline of the opening. Take the distance  $1^2$  to the rivet centre at G Fig. 18 and measure this off to locate the rivet centre on the line  $1^2 7^2$  by measuring

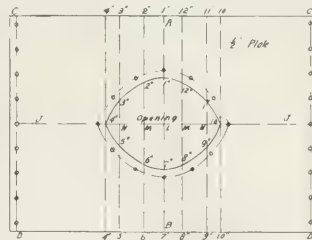


FIG. 22.

from the points  $1^2$  and  $7^2$ . Similarly locate the other points for the rivet line. Draw in this line and space off the rivets equally. Space off the rivets equally on the seams C D, so that when the plate is rolled up all the holes will come fair. This completes the templet. The method

in this problem of drawing the plate thickness is applicable to the preceding as well as the following problems when dealing with heavy plate.



### PACKING HYDRAULIC JACKS.

HYDRAULIC jacks sometimes fail to develop full capacity, or settle slowly when left standing under a load, without apparent reason. Such failures, says the engineering department of the Travellers' Insurance Co., are commonly due to defective packing. These defects are first evidenced by the failure of the jack to raise or hold the load, and, when this is noted, the jack should be examined to find out where the packing failed to hold. The leakage at the defective point is readily detected. A prominent manufacturer of hydraulic jacks makes these recommendations with regard to the valves and their seats:—

If the packing is in good order and the ram does not rise in pumping the suction valves are not working properly. If the lever rises when the hand is removed, the pressure valve is not working properly. If the valves or their seats become worn or scratched, grind them to a fit with oil and a little flour of emery. Be careful not to grind them too much, and be sure to wash the valves and their seats perfectly free from emery before putting the jack into service again. If the valves are deeply scored or have become too much worn, replace them with new ones, and grind new ones lightly to their seats, as described.



**Short Circuits** usually come on slowly, and discriminating protective gear and quick-acting circuit breakers should be a sufficient safeguard to the station without the use of reactances. While it is quite true that discriminating protective gear may do much to increase the safety factor of the system, the fact remains that "dead" short-circuits will sometimes occur, and that in such events no switch or relay is sufficiently quick-acting to open the circuit breaker before the rush of current has occurred. Furthermore, no discriminating gear can protect the generator in the event of a misphase, and it is well known that the strain on the generator may be greater in the event of a misphase than if the generator short-circuited directly across its terminals.



If a man works for you, Mr. Employer, have confidence in him. If he be not deserving of your confidence discharge him at once. Suspicion and aloofness never helped any fellow in any situation.

# EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions. Your Co-operation is Invited

### MAKING SPRINKLER TAPS.

By F. M.

THE growing use of water sprinklers for fire protection has brought out a special style of short tap for threading the connection

The pieces are next placed in a lathe and rough turned alternately on each end until within 1-32 in. of the finished sizes. The rough turning having been completed, the pieces are parted, the burr ground off and the ends centred. They are then turned in successive opera-

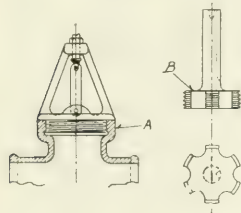


FIG. 1

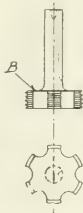


FIG. 2

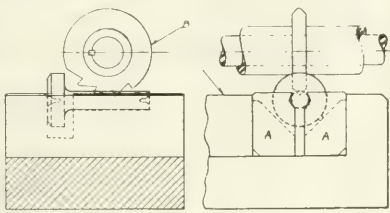


FIG. 4

MAKING SPRINKLER TAPS.

shown in Fig. 1. A sketch of the finished tap is shown in Fig. 2.

To facilitate the operation of rough turning on these taps, when made in large quantities, the stock is prepared so that all the heavy turning is performed in pairs before finishing.

The first manufacturing operation is the cutting to length, which is done in a rotary saw, as shown in Fig. 3. Six bars are placed in the vee clamps and are cut off to a length, equal to twice that of the taps plus the width necessary for parting, after they have been rough turned.

After cutting to length, the pieces are centered on each end in the centreing machine shown in Fig. 4. The work is held in a central position by means of the vee blocks C and fed to the combination centre drill A, by means of the swinging lever attached to the tail stock

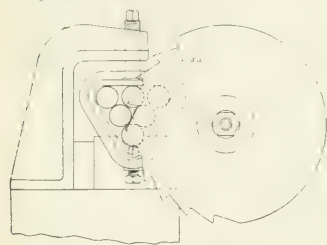


FIG. 3 MAKING SPRINKLER TAPS.

spindle. The piece B, also shown in Fig. 5, has a knurled cup centre inserted, which takes the place of a dog to prevent the work from turning while being centred.

tions of, face shoulder (leaving large fillet for strength), turn shank, turn for thread, chamfer, mill the groove, cut the thread and mill the flutes. The milling of the groove in the shank is performed in the jig shown in Fig. 6. The two steel vee blocks A A are held in the vise, thus gripping the shank of the tap and leaving room at the top for the cutter B to mill the groove.

When threading the taps, a shoe is placed in the milled groove in the shank to prevent slipping. After threading, the flutes are milled to form the tap. The lands are then backed off and the tap hardened and ground. The harden-

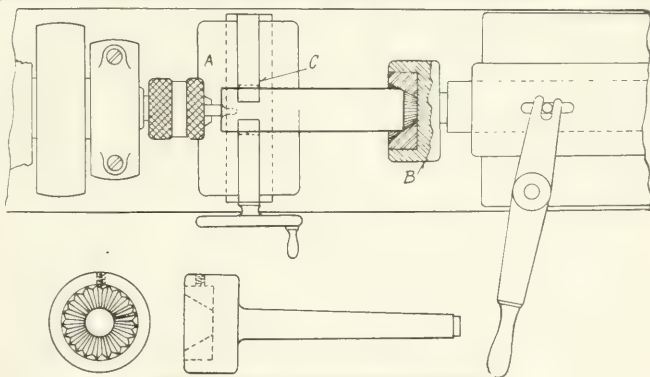


FIG. 5 MAKING SPRINKLER TAPS FIG. 4

ing was done by heating the taps in a lead bath to the proper temperature and quenching them in water or oil. After tempering the shank was ground and also the flutes with a formed wheel.

### REPAIR TO A SPUR GEAR.

By J. McCormack.

SOME time ago I observed the following repair made upon the broken teeth of a spur gear. Holes were drilled where the teeth had been, care being taken to retain the proper position. The holes were tapped of a size to suit the thickness of the teeth in the gear. The rod stock was threaded with an adjustable die and made sufficiently over-size to be a tight fit in the tapped hole. The pins were placed a little more than their own diameter apart and directly in line with the corresponding pin in the row ahead. Those in the pinion were placed to correspond with those in the gear to prevent uneven contact. This repair, although fairly serviceable, was only temporary, new gears being secured within a few days.



### COST KEEPING IN SMALL WORKS.

By M. B. Saunders.

THE one great trouble that the manager of the small jobbing shop has is to be able to keep a really accurate system of costs, without having a large staff to handle it. The following is an outline of a cost system used in a small shop, doing a very great variety of repairs, as well as a small amount of manufacturing.

Numbered order sheets A, are kept in the office, and when a job comes in, the name and details are entered in daph-

ate by means of a piece of carbon paper on the right half of the form A; the part marked A1 being torn off and given to the foreman. The large part A, being then put in a loose leaf binder and kept





# CONTEMPORARY WAR ARTICLES

Embracing Information and Data Drawn from a Variety of Sources Relative to and Arising from the Prosecution of this Many-Sided European War

## THE "LEWIS" AUTOMATIC MACHINE GUN.

THE machine guns which the Ontario Government will supply to our overseas forces at a cost of \$200,000, might rather be termed rifles. The official name of the weapon is "The Lewis Automatic Machine Gun." It weighs only 25 pounds without its tripod support, which is four and a half pounds in weight. Thus the whole gun may be carried about by one man, and operated by one man, without difficulty. A powerful man may even use the weapon from the shoulder, as though it were an ordinary rifle. One gun can fire 440 rounds per minute, including the time necessary to change magazines, each of which contains 47 rounds. It is in operation in the French and Belgian trenches at the present time, and is somewhat similar to a Hotchkiss automatic rifle employed by the French.

moved and a "spade handle" substituted.

### Constructional Features.

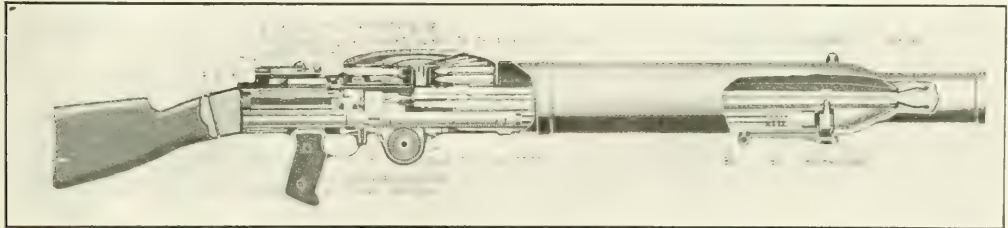
The gun is of very ingenious construction. A detachable magazine loaded with 47 cartridges is attached to a suitable fixing on the barrel near its rear end, the first cartridge being fed from the magazine into the firing chamber by the first forward movement of the firing pin, which is, however, arrested before the striker reaches the cartridge unless the trigger is held back. When the trigger is pressed, the striker, carried forward by the mainspring, explodes the cartridge in position in the firing chamber.

Before the bullet leaves the barrel under the influence of the gas pressure, it uncovers a hole connecting the barrel with a cylinder below and lying parallel with it. A portion of the gas passes into the lower cylinder, driving back the piston, and with it, the rod against the

zine are exhausted, the rate of continuous fire being as high as 440 rounds per minute, including the interval occupied by replacing empty magazines with loaded ones.

### Dissipating Barrel Heat.

The dissipation of the intense heat developed by the almost continuous combustion of explosive charges in the barrel of the machine gun presents a somewhat difficult problem, and failure to accomplish this efficiently causes the barrel to become red hot and prematurely to explode the incoming cartridge. The barrels of the Lewis and the Hotchkiss guns are both cooled by means of ribs which radiate the heat into the atmosphere, those of the Lewis being placed longitudinally and contained in a steel casing, through which cool air is drawn by the "exhausting" effect of the powder blast in the muzzle end of the casing, in the same way that the air is drawn



THE "LEWIS" AUTOMATIC MACHINE GUN.

1. Butt stock. 2. Butt plate screws. 3. Butt. 4. Butt tang screw. 5. Butt tang. 6. Fore cover. 7. Butt stock screw. 8. Back sight bed spring. 9. Back sight bed spring screw. 10. Butt plate sliding. 11. Back sight bed. 12. Fore cover. 13. Fore cover. 14. Back sight bed. 15. Back sight thumb piece. 16. Back sight slide catch. 17. Back sight nut. 18. Back sight nut. 19. Back sight nut. 20. Back sight nut. 21. Back sight nut. 22. Back sight nut. 23. Back sight nut. 24. Back sight nut. 25. Back sight nut. 26. Back sight nut. 27. Back sight nut. 28. Back sight nut. 29. Back sight nut. 30. Back sight nut. 31. Back sight nut. 32. Back sight nut. 33. Back sight nut. 34. Back sight nut. 35. Back sight nut. 36. Back sight nut. 37. Back sight nut. 38. Back sight nut. 39. Back sight nut. 40. Back sight nut. 41. Back sight nut. 42. Back sight nut. 43. Back sight nut. 44. Back sight nut. 45. Back sight nut. 46. Back sight nut. 47. Back sight nut. 48. Back sight nut. 49. Back sight nut. 50. 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The Lewis gun is designed in such a manner that the only tool necessary to dismantle it completely is an ordinary service cartridge, the point of whose bullet is used to disconnect every portion of the mechanism: and this operation is such a simple matter that the gun can be "knocked down" and any small damaged part replaced, well inside five minutes. The weapon takes the service ammunition, and its range is similar to that of the service rifles. When used on a fixed mount the butt stock may be re-

moved and a "spade handle" substituted. The movement of the mechanism. The movement of the rod recocks the gun, throws out the exploded cartridge case, and during the early stage of its return journey, under the mainspring's influence, transfers a live cartridge from the magazine to the chamber.

If the gunner lets go the trigger the firing ceases, and the gun remains cocked until the trigger is again pressed; if, however, he keeps a continuous pressure on the trigger, the weapon continues to fire until all the cartridges in the maga-

zine are exhausted, the rate of continuous fire being as high as 440 rounds per minute, including the interval occupied by replacing empty magazines with loaded ones.

### Recoil Feature.

The recoil on the Lewis gun is counter-balanced in a very simple and ingenious manner, the gas from the discharge being directed by means of a cone attached to the muzzle of the barrel proper, on to the inner surface of the casing, so that the friction between the gas and the metal casing tends to carry the gun forward with the stream of gas, and so



counter-balances the force of the recoil acting in the opposite direction.

The mainspring of the Hotchkiss gun takes the form of an ordinary coil-spring acting in compression situated in the cylinder underneath the barrel; whilst the same unit in the Lewis is a spring of the type used for the mainspring of a watch, but naturally of a much greater power. This spring is coiled up in a circular case attached to the gun just in front of the trigger, in a position sufficiently far from the barrel to be unaffected by the heat, and, consequently, in no danger of losing its temper from overheating. The Hotchkiss mainspring acts directly on the piston rod, which it surrounds; whilst the Lewis is coupled to its rod by a rack and pinion.

The magazine of the Lewis gun is circular in shape, the forty-seven cartridges with which it is loaded lying radially in two layers with their bullets pointing toward the centre.



#### MODERN MUNITIONS OF WAR.

AT the Royal Society of Arts recently, Professor Vivian B. Lewes delivered the first of a special course of three lectures on the subject of "Modern Munitions of War." The particular branch dealt with was "Guns and Propellants." The remaining lectures on "Mines, Shells and High Explosives" and "Poison Gases and Incendiary Bombs" were given on July 14 and 21 respectively. Sir Boverton Redwood was in the chair, and in introducing the lecturer said that in view of the diabolical ingenuity with which the enemy is carrying on this policy of frightfulness, it was well that the public should be enlightened upon the subject of munitions.

Professor Lewes said: Looking over all the wars we had been engaged in, it would be found that the cry had always been the same. In the Napoleonic wars our troops were crying out for shot and shell. Later, in the Crimea, fodder and food were required in addition to shot and shell, and in the South African War it was really the comparatively small amount of ammunition that was required which prevented us being in terrible trouble then. When the history of the present war comes to be written when we have cooled down somewhat and see things in their true perspective — the most wonderful thing of all will be that our supplies of ammunition have been so remarkably good, and that in this war the ammunition supply had been far superior to what it had been in any other war we had ever waged.

#### Progress in Guns.

As showing the immense strides that have been made in guns and propellants, the lecturer drew attention to the fact

that in the Napoleonic wars the old Victory had a broadside of fifty-two guns, and if the whole of that broadside was fired at once the weight of metal thrown was only 60 per cent. of the weight of one shell thrown by the 15-in. guns of our present super-dreadnoughts.

The next development was to rifle the guns, which gave increased range and greater accuracy. Then it became necessary to lengthen the guns in order to get the best effect of the rotation due to the rifling. This progress continued, and by the time of the bombardment of Alexandria in 1882, the smallest gun was double the size of the biggest gun in the Crimea. The old Inflexible in 1882 had four 80-ton guns, 16-in. calibre, an inch bigger than we have to-day, and by 1886 the size had increased to 110 tons, with a calibre of 16.25-in. using a charge of 960 lb. of powder.

#### Progress in Explosives.

Since that time an enormous increase had taken place in armaments which was accompanied by a very great change in our explosives. In the Crimea, with the 68-pounders, "rifle large grain" powder was used, but after the rifling of the guns was adopted and the guns were lengthened, it was found that this powder occasioned too great a stress on the breech of the gun, coupled with too low a muzzle velocity. To remedy these defects what was known as "rifle indent powder" was used, but this proved to be too expensive, and the Government found a way out by manufacturing what was termed "pebble" powder, the "pebbles" being gradually increased in size until they reached  $1\frac{3}{4}$  in. cube. The desideratum was slow-burning, with a constantly increasing pressure, and "pebble" powder was not altogether satisfactory.

For many years this was an enormous trouble, until General Rodman, of the United States, suggested large solid cartridges with holes from end to end. The explosion passed through these holes, which gave the larger surface necessary to give the increased pressure of gas. It was a beautiful suggestion, but absolutely impracticable owing to the difficulty of obtaining uniformity in density in the powder, and the liability of the cartridge to crack. The idea, however, was put into practical form in prism powder. In this, the powder was made up into prisms with holes in the centre, and as large a cartridge as was desired could be built up in this way.

#### Smokeless Powder and Gun Cotton.

The next trouble that arose was the enormous quantity of smoke given off, both by rifle powder and prism powder, and it was quickly realized that a smokeless powder was a necessity. In this connection a long line of interesting researches had been carried out in the

earlier years of last century. Brief reference was made to the work of Brockenau and Pellets, two French chemists who laid the foundations for the development of smokeless powder. Following this came the discovery of gun-cotton by Schonbein, the Swiss chemist.

Professor Lewes went on to mention the mysterious explosions in various countries which occurred within the next two years, and the complete abandonment of gun-cotton for a time. Meanwhile, the use of gun-cotton was kept alive by the discovery that a lower form of it could be manufactured by using a weaker solution of nitric acid. Subsequently, General von Leuck, of Austria, discovered the true cause of the earlier failures, viz., that as the gun-cotton consisted of fibres acting as minute tubes, these, in spite of washing, retained a certain small quantity of nitric acid. Hence the explosions when the gun-cotton was packed. This having been settled beyond doubt, the quest for a smokeless powder took everyone back to gun-cotton, rendered safe as we now know it, and the man who had never really got the credit for the discovery of converting gun-cotton into a smokeless powder was Dr. Walter Reid, who discovered a smokeless sporting powder.

At the present time nearly every country was making a descendant of this powder of Reid's as their service explosive. The Austrians, Germans, Russians and French were all using nitro-cotton powders, although we ourselves were using nitro-glycerine powder, for the reason that our service powder had to stand the climate of all parts of the world. At the same time it was so unstable that its use per se was extremely difficult and had to be safeguarded by all sorts of restrictions. The German navy, however, used nitro-glycerine powder on account of its smaller bulk and consequently lesser storage space required.

Nobel found that by mixing collodion with nitro-glycerine a gelatine body was obtained. He called this blasting gelatine, and this was still the finest mining engineering explosive in the world. Furthermore, Nobel had noticed that a mixture of nitro-cotton and nitro-glycerine tamed down the exuberant properties of both, and, together with General Hess, of the Austrian army, obtained a wonderfully fine smokeless powder by mixing it with camphor. Later on, however, Sir Frederick Abel and Professor—now Sir James Dewar found that a more powerful and suitable powder could be obtained by blending true gun-cotton and nitro-glycerine. They were mixed by means of acetone, which was afterwards evaporated off, and the result, to which 5 per cent. of vaseline was put in as a lubricant for the gun, was the smokeless powder known as cordite.

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### WAR ORDERS AND STOCK MARKET SPEULATION.

**A** RISING out of the war, business in many spheres of industrial enterprise has been—to put it mildly—stimulated. Metal working plants are particular beneficiaries, although, as regards the personal equipment feature, many other sections of our manufacturing community are experiencing an almost equivalent boom.

A few month's ago, Sir George E. Foster, Canadian Minister of Trade and Commerce in the course of an eloquent address before Ward Three Conservative Association, Toronto, hazarded the opinion that before peace again reigned "this war would sadden us and make us a

more serious people, and would teach us that there is something more to live for than mere business, speculation and pleasure."

We are somewhat at a loss as to the popular classification of his then prediction, in a word, whether it were viewed from the standpoint of its avowed intention—the optimistic, or its opposite—the pessimistic. However it be, recent happenings give clear indication that Sir George was all wrong in attributing either sadness or seriousness as our portion of the grim struggle. Each succeeding month of the war duration appears to have been getting us just that much further away from the dual state referred to, and through the increasing demand for war munitions and supplies, is making us to all intents and purposes oblivious of our real individual place and part in the issues at stake.

Patriotism, Sir George made very clear, means sacrifice and not its commonly experienced substitute—skillfully masked service to our individual profit. If we would judge, however, by the wild speculation which has prevailed for several weeks in prominent industrial stocks, it is quite apparent that the attempt to make personal profit out of real or imaginary war order business is the primary and all-important consideration. All of this is, of course, a sure menace to legitimate business, and of necessity must be reckoned with sooner or later.

Men who have been observers of Wall Street for half a century say that while there have been manipulations in the past, those now being carried on are more open than any ever before perpetrated. What is true of Wall Street is equally true of our Canadian stock exchanges.

Industrially, and as a matter of fact in every department of our national life, we have for quite many months suffered severely from excesses of a similar nature. The convalescing process has been a long and trying one, and such as might at least have been expected to breed caution in the future. Not so, however; the war has provided the opportunity and excuse whereby stocks and shares of our industrial enterprises may be deliberately manipulated so that their price be forced up to figures altogether foreign to their value, and so that an unsuspecting public in its thousands and tens of thousands be fleeced and absolutely ruined. The hardships engendered by the excesses and speculation practised in the few years preceding twenty months ago will be but a mere bagatelle when compared to what may be expected when this war order stock speculation comes, as it certainly will to its logical and disastrous end.

We make complaint that much of the war order business that should have been ours has been placed in the United States, and we are not satisfied because of the apparent lack of further and greater consideration being given us in the matter of orders, in the filling of which we have shown ourselves to be fully competent. More war contracts placed, if simply made an excuse for stock manipulation instead of being considered the legitimate business of our Dominion, will in the nature of things contribute little of blessing to our people but much of curse.

Public opinion was never in our history in more need of being aroused than it is to-day relative to stock market gambling in Canadian "Industrials," and, as on the occasion of the outbreak of the war, those responsible for the conduct of our stock exchanges took drastic measures to meet the then abnormal situation, and did so successfully, it is equally incumbent, if not more so that they now tackle the new situation and get it on a sane basis before it gets altogether out of hand and culminates in a business dislocation and demoralization from which it may take well on to a decade to bring back again to normal.



# SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

## PIG IRON.

Grey Forge, Pittsburgh	\$13 20	\$13 45
Lake Superior, charcoal, Chicago	15 75	
Ferro Nickel pig iron (Soo)	25 00	

	Montreal.	Toronto.
Middlesboro, No. 3	21 00	
Carron, special	22 00	
Carron, soft	22 00	
Cleveland, No. 3	21 00	
Clarence, No. 3	21 00	
Glengarnock	25 00	
Summerlee, No. 1	25 00	
Summerlee, No. 3	25 00	
Michigan charcoal iron	25 00	
Victoria, No. 1	21 00	19 00
Victoria, No. 2X	21 00	19 00
Victoria, No. 2 Plain	21 00	19 00
Hamilton, No. 1	20 00	19 00
Hamilton, No. 2	20 00	19 00

## FINISHED IRON AND STEEL.

Per Pound to Large Buyers.	Cents.
Common bar iron, f.o.b., Toronto	2.20
Steel bars, f.o.b., Toronto	2.20
Common bar iron, f.o.b., Montreal	2.20
Steel bars, f.o.b., Montreal	2.20
Twisted reinforcing bars	2.20
Bessemer rails, heavy, at mill	1.25
Steel bars, Pittsburgh	1.25
Tank plates, Pittsburgh	1.25
Beams and angles, Pittsburgh	1.25
Steel hoops, Pittsburgh	1.40
F.O.B., Toronto Warehouse.	Cents.
Steel bars	2.10
Small shapes	2.35
Warehouse, Freight and Duty to Pay.	Cents.
Steel bars	1.90
Structural shapes	1.95
Plates	1.95

Freight, Pittsburgh to Toronto.  
18.9 cents carload; 22.1 cents less carload.

## BOILER PLATES.

	Montreal.	Toronto.
Plates, ¼ to ½ in., 100 lb.	\$2 35	\$2 25
Heads, per 100 lb.	2 55	2 45
Tank plates, 3-16 in.	2 60	2 45

## OLD MATERIAL.

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	\$12 50	\$12 50
Copper, crucible	14 50	14 50
Copper, unch-bled, heavy	14 00	14 00
Copper, wire, unch-bled	14 00	14 00
No. 1 machine, compos'n	11 50	12 50
No. 1 compos'n turnings	10 50	9 25
No. 1 wrought iron	6 00	6 00
Heavy melting steel	5 75	6 00
No. 1 machin'y cast iron	10 50	10 50
New brass clippings	12 00	12 00
No. 1 brass turnings	10 00	10 00
Heavy lead	4 50	4 75

Tea lead	\$ 3 50	\$ 3 50
Scrap zinc	12 00	13 00

## W. I. PIPE DISCOUNTS.

Following are Toronto jobbers' discounts on pipe in effect June 25, 1915:

	Butt Weld Black Standard	Gal.	Lap Weld Black	Gal.
1½, 3 in.	63	32½		
1½ in.	68	41½		
2 to 1½ in.	73	46½		
3 in.	73	46½	69	42½
2½ to 4 in.	73	46½	72	45½
4½, 5, 6 in.			70	43½
7, 8, 10 in.			67	40½
	X Strong P. E.			
1½, 3 in.	56	32½		
1½ in.	63	39½		
¾ to 1½ in.	67	43½		
2, 2½, 3 in.	68	44½		
2 in.			63	39½
2½ to 4 in.			63	42½
4½, 5, 6 in.			66	42½
7, 8 in.			59	35½
	XX Strong P. E.			
1½ to 2 in.	44	20½		
2½ to 6 in.			43	19½
7 to 8 in.			40	16½

	Genuine Wrot Iron.
¾ in.	57
1½ in.	62
¾ to 1½ in.	67
2 in.	67
2½, 3 in.	67
3½, 4 in.	66
4½, 5, 6 in.	63
7, 8 in.	60

	Wrought Nipples.
4 in. and under	77½%
4½ in. and larger	72½%
	Standard Couplings.
4 in. and under	60%
4½ in. and larger	40%

## MILLED PRODUCTS.

Sq. & Hex. Head Cap Screws	65%
Sq. Head Set Screws	65 & 10%
Rd. & Fil. Head Cap Screws	45%
Flat & But. Head Cap Screws	40%
Finished Nuts up to 1 in.	70%
Finished Nuts over 1 in.	70%
Semi-Fin. Nuts up to 1 in.	70%
Semi-Fin. Nuts over 1 in.	72%
Studs	65%

## METALS.

	Montreal.	Toronto.
Lake copper, carload	\$21 00	\$21 00
Electrolytic copper	20 75	20 75
Castings, copper	20 50	20 50
Tin	41 00	41 00
Spelter	23 00	23 00
Lead	7 00	7 00
Antimony	40 00	40 00
Aluminum	40 00	40 00

Prices per 100 lbs.

## BILLETS.

	Per Gross Ton
Bessemer, billets, Pittsburgh	\$22 00
Openhearth billets, Pittsburgh	22 00
Forging billets, Pittsburgh	28 00
Wire rods, Pittsburgh	25 50

## NAILS AND SPIKES.

Standard steel wire nails, base	\$2 40	\$2 35
Cut nails	2 50	2 70
Miscellaneous wire nails	75	per cent.
Pressed spikes, ⅝ diam., 100 lbs.	2 85	

## BOLTS, NUTS AND SCREWS.

	Per Cent.
Coach and lag screws	75
Stove bolts	80
Plate washers	40
Machine bolts, ¾ and less	70
Machine bolts, 7-16 and over	60
Blank bolts	60
Bolt ends	60
Machine screws, iron, brass	35 p.c.
Nuts, square, all sizes	4¼c per lb. off
Nuts, Hexagon, all sizes	4¾c per lb. off
Iron rivets	72½ per cent.
Boiler rivets, base, ¾-in. and larger	\$3.25
Structural rivets, as above	3.25
Wood screws, flathead, bright	85, 10, 7½, 10 p.c. off
Wood screws, flathead, Brass	75 p.c. off
Wood screws, flathead, Bronze	70 p.c. off

## LIST PRICES OF W. I. PIPE.

Standard.	Extra Strong.	D.	Ex. Strong.
Nom. Price.	Size Price	Size Price	Size Price
Diam. per ft.	Ins. per ft.	Ins. per ft.	Ins. per ft.
1½in .05½	1½in .12	1½ .32	
1¼in .06	1¼in .07½	¾ .35	
¾in .06	¾in .07½	1 .37	
1½in .08½	1½in .11	1¼ .52½	
¾in .11½	¾in .15	1½ .65	
1 in .17½	1 in .22	2 .91	
1¼in .23½	1¼in .30	2½ 1.37	
1½in .27½	1½in .36½	3 1.86	
2 in .37	2 in .50½	3½ 2.30	
2½in .58½	2½in .77	4 2.76	
3 in .76½	3 in 1.03	4½ 3.26	
3½in .92	3½in 1.25	5 3.86	
4 in 1.09	4 in 1.50	6 5.32	
4½in 1.27	4½in 1.80	7 6.35	
5 in 1.48	5 in 2.08	8 7.25	
6 in 1.92	6 in 2.86		
7 in 2.38	7 in 3.81		
8 in 2.50	8 in 4.34		
8 in 2.88	9 in 4.90		
9 in 3.45	10 in 5.48		
10 in 3.20			
10 in 3.50			
10 in 4.12			

**COKE AND COAL.**

Solvay Foundry Coke .....	\$5.75
Connellsville Foundry Coke..	4.85-5.15
Yough, Steam Lump Coal .....	3.83
Penn. Steam Lump Coal .....	3.63
Best Slack .....	2.99

Net ton f.o.b. Toronto.

**COLD DRAWN STEEL SHAFTING.**

At mill .....	45%
At warehouse .....	40%

Discounts off new list. Warehouse price at Montreal and Toronto.

**MISCELLANEOUS.**

Solder, half-and-half .....	26 3/4
Putty, 100-lb. drums .....	2.70
Red dry lead, 100-lb. kegs, per cwt.	9.67
Glue, French medal, per lb. ....	0.18
Tarred slaters' paper, per roll ..	0.95
Motor gasoline, single bbls., gal. ..	0.18
Benzine, single bbls., per gal. ....	0.18
Pure turpentine, single bbls. ....	0.66
Linseed oil, raw, single bbls. ....	0.67
Linseed oil, boiled, single bbls. ....	0.70
Plaster of Paris, per bbl. ....	2.50
Plumbers' Oakum, per 100 lbs. ....	4.00
Lead wool, per lb. ....	0.10
Pure Manila rope .....	0.16
Transmission rope, Manila .....	0.20
Drilling cables, Manila .....	0.17
Lard oil, per gal. ....	0.73
Union thread cutting oil .....	0.60
Imperial quenching oil .....	0.35

**POLISHED DRILL ROD.**

Discount off list, Montreal and Toronto .....	40%
---	-----

**PROOF COIL CHAIN.**

1/4 inch .....	\$8.00
5-16 inch .....	5.35
3/8 inch .....	4.60
7-16 inch .....	4.30
1/2 inch .....	4.05
9-16 inch .....	4.05
5/8 inch .....	3.90
3/4 inch .....	3.85
7/8 inch .....	3.65
1 inch .....	3.45

Above quotations are per 100 lbs.

**TWIST DRILLS.**

Carbon up to 1 1/2 in. ....	% 60
Carbon over 1 1/2 in. ....	25
High Speed .....	40
Blacksmith .....	60
Bit Stock .....	60 and 5
Centre Drill .....	20
Ratchet .....	20
Combined drill and c.t.s.k. ....	15

Discounts off standard list.

**REAMERS.**

Hand .....	% 25
Shell .....	25
Bit Stock .....	25
Bridge .....	65
Taper Pin .....	25
Centre .....	25
Pipe Reamers .....	80

Discounts off standard list.

**IRON PIPE FITTINGS.**

Canadian malleable, 35 per cent.; cast iron, 60; standard bushings, 60; headers, 60; flanged unions, 60; malleable bushings, 60; nipples, 75; malleable, lipped unions, 65.

**TAPES.**

Chesterman Metallic, 50 ft. ....	\$2.00
Lufkin Metallic, 603, 50 ft. ....	2.00
Admiral Steel Tape, 50 ft. ....	2.75
Admiral Steel Tape, 100 ft. ....	4.45
Major Jun., Steel Tape, 50 ft. ....	3.50
Rival Steel Tape, 50 ft. ....	2.75
Rival Steel Tape, 100 ft. ....	4.45
Reliable Jun., Steel Tape, 50 ft. ..	3.50

**SHEETS.**

	Montreal	Toronto
Sheets, black, No. 28. ....	\$3 00	\$2 90
Canada plates, dull, 52 sheets .....	3 25	3 50
Canada Plates, all bright. ....	4 40	4 60
Apollo brand, 10 3/4 oz. galvanized .....	6 40	5 95
Queen's Head, 28 B.W.G. ....	6 50	6 50
Fleur-de-Lis, 28 B. W. G. ....	5 75	5 75
Gorbal's Best, No. 28. ....	6 50	6 50
Viking metal, No. 28. ....	6 00	6 00
Colborne Crown, No. 28. ....	5 38	5 30

**BOILER TUBES.**

Size	Seamless	Lapwelded
1 in. ....	\$11 00	.....
1 1/4 in. ....	11 00	.....
1 1/2 in. ....	11 00	.....
1 3/4 in. ....	11 00	.....
2 in. ....	11 50	9 20
2 1/4 in. ....	13 00	.....
2 1/2 in. ....	14 00	12 10
3 in. ....	16 00	12 70
3 1/4 in. ....	.....	13 90
3 1/2 in. ....	20 00	15 00
4 in. ....	25 50	18 90

Prices per 100 feet, Montreal and Toronto.

**WASTE.**

	WHITE.	Cents per lb.
XXX Extra .....	0 10 1/4	
X Grand .....	0 09 3/4	
XLGR .....	0 09 1/4	
X Empire .....	0 08 1/2	
X Press .....	0 07 3/4	
Lion .....	0 07 1/4	
Standard .....	0 06 3/4	
Popular .....	0 05 3/4	
Keen .....	0 05 1/4	

**WOOL PACKING.**

Arrow .....	0 16
Axle .....	0 11
Anvil .....	0 08
Anchor .....	0 07

**WASHED WIPERS.**

Select White .....	0 09
Mixed Colored .....	0 06 1/4
Dark Colored .....	0 05 1/4

This list subject to trade discount for quantity.

**BELTING RUBBER.**

Standard .....	.50%
Best grades .....	.30%

**BELTING—NO. 1 OAK TANNED.**

Extra heavy, sgle. and dble. ....	50%
Standard .....	50 & 10%
Cut leather lacing, No. 1 .....	\$1.20
Leather in sides .....	1.10

**ELECTRIC WELD COIL CHAIN B.B.**

3-16 in. ....	\$9.00
1/4 in. ....	6.25
5-16 in. ....	4.65
3/8 in. ....	4.00
7-16 in. ....	4.00
1 1/2 in. ....	4.00

Prices per 100 lbs.

**PLATING CHEMICALS.**

Acid, boric .....	\$ .15
Acid, hydrochloric .....	.05
Acid, hydrofluoric .....	.06
Acid, Nitric .....	.10
Acid, sulphuric .....	.05
Ammonia, aqua .....	.08
Ammonium carbonate .....	.15
Ammonium chloride .....	.11
Ammonium hydrosulphuret .....	.35
Ammonium sulphate .....	.07
Arsenic, white .....	.10
Copper sulphate .....	.10
Cyanide of potassium (95 to 96%) ..	.35
Iron perchloride .....	.20
Lead acetate .....	.16
Nickel ammonium sulphate .....	.10
Nickel carbonate .....	.50
Nickel sulphate .....	.20
Potassium carbonate .....	.40
Potassium sulphide .....	.30
Silver chloride (per oz.) .....	.65
Silver nitrate (per oz.) .....	.45
Sodium bisulphite .....	.10
Sodium carbonate crystals .....	.04
Sodium cyanide .....	.35
Sodium hydrate .....	.04
Sodium hyposulphite (per 100 lbs.) ..	3.00
Sodium phosphate .....	.14
Tin chloride .....	.45
Zinc chloride .....	.20
Zinc sulphate .....	.08

Prices Per Lb. Unless Otherwise Stated.

**ANODES.**

Nickel .....	.47 to .52
Cobalt .....	1.75 to 2.00
Copper .....	.25 to .28
Tin .....	.45 to .50
Silver .....	.55 to .60
Zinc .....	.30 to .33

Prices Per Lb.

**PLATING SUPPLIES.**

Polishing wheels, felt. ....	1.50 to 1.75
Polishing wheels, bullneck. ....	.80
Emery in kegs .....	4 1/2 to .06
Pumice, ground .....	.05
Emery glue .....	.15 to .20
Tripoli composition .....	.04 to .06
Crocus composition .....	.04 to .06
Emery composition .....	.05 to .07
Rouge, silver .....	.25 to .50
Rouge, nickel and brass. ....	.15 to .25

Prices Per Lb.



## The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

**Toronto, Ont., Aug. 10, 1915.**—There is little change to note in the industrial situation, conditions being much the same as during the last few weeks. Compared with conditions prevailing one year ago, the business outlook is favorable, and the steady improvement in trade is distinctly encouraging. Perhaps the most interesting feature is the improvement in the steel trade. Twelve months ago, conditions in the steel trade were very quiet and production had fallen off considerably. Now the mills are very active, and working almost to capacity. Production is practically all on account of the war. The crop reports generally are very favorable, and if the yield is as good as is anticipated, it will be of the greatest benefit to the country.

The trade returns for the Dominion for the last fiscal year recently published by the Department of Trade and Commerce contain some interesting figures. The imports of merchandise fell off by nearly 163 million dollars, as compared with 1914, while the exports showed an increase of a little more than four millions. The encouraging feature, however, is the fact that for the first time in many years the balance of trade in regard to exports and imports is in Canada's favor. This condition is, of course, entirely as a result of the war. The increase in exports of manufactured goods being one of the principal reasons for the favorable trade balance.

### Steel Market.

The outlook in the steel trade continues to improve, which is due almost entirely to war business. Canadian mills are operating almost to capacity, and, in addition to the output of forgings and bars for shells, are producing other steel products, both finished and semi-finished.

It is reported that negotiations are pending between the Dominion Steel Corporation and the French Government for a large order of finished shells. It is understood that, while nothing has been definitely settled, a contract will be signed at an early date. If this business is closed the outlook in the shell industry will improve considerably, as it may lead to other orders for shells being placed here in addition to those being handled by the Shell Committee. It is rumored that the Russian Government has awarded another large contract for shells to the Canadian Car and Foundry Co. In any case it is extremely probable that it will be distributed among the same concerns in the States as the

previous contract, and so will not be of any particular interest to manufacturers on this side of the line.

Prices on bars, plates, and small shapes are holding very firm, and higher prices for Pittsburgh products may be expected any time. Boiler tubes have advanced approximately \$1 per 100 feet. Wrought iron pipe is very firm and an advance is expected in the near future. Galvanized sheets are easier to obtain, and spelter has declined somewhat. Some makers are still out of the market, and are only filling up old contracts. Prices of galvanized sheets are unchanged but have an easier tendency. The black sheet market is steadily gaining strength

### OUR EMPIRE COHESION.

It needed this one supreme struggle to teach the world that when an enemy grappled with the British Empire, or part of the Empire, he grappled with the whole. The British Empire is stronger to-day than ever before. It will signalize to neutrals that it is more than a name; it will demonstrate that the one great unity is to be reckoned with as a whole, and not in sections. The Empire will be a power for peace that never existed before, and go far to solve the international relations of the world.

and quotations are firm with an upward tendency.

The high-speed tool steel situation is acute, and fears are expressed that the shortage will be very serious, if it has not already become so.

The conditions in the steel trade in the States continue to improve, and big business is being done in rounds for shells. Mills are so well supplied with orders for bars that they are conservative about taking on any more tonnage, although large orders are offering from foreign countries. The market is well established at \$1.30, Pittsburgh, and it is expected that \$1.35 will soon prevail.

### Pig Iron.

Furnaces connected with steel plants continue active, but the demand for foundry iron is light. The pig iron situation is improving in the States, and prices have a higher tendency.

### Scrap Metals.

The market for heavy melting steel is active, and quotations firmer. Prices of

copper and brass scrap are holding firm on good demand. Scrap lead is quiet, and prices have a weaker tendency. Zinc is quiet, and unchanged.

### Machine Tools.

There is no change in the machine tool situation, and business is quieter after the recent spell of great activity. Inquiries are being sent out by firms contemplating making shells, but few orders have been placed except by those firms already engaged in making shells who are adding to their equipment. Makers of machine tools are very busy, and deliveries are still very backward. Dealers are not idle, however, by any means, as they fully expect increased activity later, and are making preparations to meet the demand as far as possible.

### Supplies.

Business continues brisk in machine shop supplies. Prices are holding firm, and there are few changes of importance to note. Transmission rope is now being quoted at 20c per pound. The lined oil market is unsettled, but prices are unchanged. An advance in the price of white waste will probably be announced very shortly.

### Metals.

Continued weakness characterizes the metal markets. There has been no sign of a recovery during the week, and the weakness has been further intensified in the London market by the depression following the fall of Warsaw. While this loss indicates that the war will be prolonged and therefore increases demand for munitions and their many requirements, yet for the time being these facts have been offset by the psychological aspect of the situation. The metals principally affected are tin, copper, spelter and lead, which have all declined in London, and also locally, with the single exception of copper, which, although dull, is unchanged. The antimony spot market is easier, but quotations are unchanged. The volume of business continues good, and compares very favorably with conditions prevailing twelve months ago, altogether apart from the increase in the demand for metals for munitions.

**Tin.**—The market in London is depressed and has declined again. Conditions in the States are good, but the New York market has been affected in sympathy with London. There is some scarcity of spot tin, and if there were a better tone in the market, a recovery might be expected. Tin has declined 1c, and is quoted locally at 41c per pound.

**Copper.**—The depression caused by the fall of Warsaw has unsettled the market, but quotations have been maintained. The prospect of a war of longer duration improves the position of cop-

per owing to the consequent larger demand for this metal. The market is dull and prices are unchanged at 21c per pound.

**Spelter.**—The market is weak, and lower with little buying. There is an entire absence of inquiry, and efforts to draw bids from buyers have met with little success. The scarcity of spot spelter has been largely overcome by the output of the smelters. Export orders have dropped off, and although these have been large over recent months, the shipments represent orders placed some time ago. Spelter has declined 2c and quotations are nominal at 23c per pound.

**Lead.**—There is practically no demand for lead, and the market is weak. It is extremely probable that the "Trust" will have to reduce their prices. Local prices have declined  $\frac{1}{4}$ c, and quotations are nominal at 7c per pound.

**Antimony.**—The spot market is easier, but there is a good inquiry for extended futures. Supplies of antimony are easier to obtain, but quotations are unchanged, and nominal at 40c per pound.

**Aluminum.**—There is no improvement in the situation as regards scarcity of aluminum. The market is firm and quotations nominal at 40c per pound.

**St. John, N.B., August 7.**—A practical suggestion for the speeding up of munitions supplies in Canada, at least so far as St. John is concerned, was heard by D. A. Thomas, former Welsh M.P., now touring Canada as special representative for Lloyd George, when he visited this city yesterday. Should the suggestion be adopted, it would have a far-reaching effect upon the city in the way of employment, besides contributing to the increased output of supplies of war.

In his inspection of the lately installed plant in the local Exhibition Buildings, Mr. Thomas was told by George McAvity, of T. McAvity & Sons, Ltd., that his firm intended to treble its output of shells and its proposed plant if sufficient orders were received. Beyond that, Mr. McAvity offered to the War Office the advantages of the whole expenditure to date on the plan and foundations of the site that T. McAvity & Sons, Ltd., have acquired in Marsh Road, and of the firm's whole technical experience, if they wanted to erect a special factory for munitions. The offer was unconditional, except that the buildings and site should revert to the firm at the close of the war.

Some idea of the vastness of the offer may be gleaned from the fact that already upwards of \$10,000 has been spent in preliminary work by the firm for iron and brass foundry purposes. Mr. McAvity particularly impressed upon the

visitor the advantages in the way of shipping from an ice-free port, open all the year round, and said that if agreed upon, the new works could be in operation by next December, a matter of only a few months. The offer was heard with attentive interest by Mr. Thomas, who will report upon it.

Mr. Thomas while in St. John visited the various factories and foundries where war supplies are being manufactured, including those of T. McAvity & Sons, James Fleming, the Wilson Box Factory, and others. He did the same in Moncton, New Glasgow, Halifax and other centres in the Maritime Provinces. Speaking of Canada's share in manufacture of materials, he said that the progress made had been most remarkable. The only plant of its kind in Canada, a year ago, had been the small arsenal at Ottawa, employing about three hundred men. To-day more than one hundred towns, villages and cities through the Dominion were engaged in making supplies for war purposes. In view of the tremendous sacrifice Canada was making, he said, the British Government felt she should have all the war orders possible, especially since she had shown herself well able to meet them.

#### A New Elevator.

General Manager Gutelius, of the Government Railways, was in St. John this week, and was interviewed by a delegation from the Board of Trade. He assured them of pending improvements at this port as soon as finances were bettered, and of particular interest to St. John and Canada as a whole, he made the statement that a new elevator was to be erected here, not far from the Atlantic Sugar Refinery in Lower Cove. The new facilities would include also two piers 750 feet long. The elevator would replace that which was destroyed by fire last summer, and which would not be rebuilt on the old site because of other plans being had for work there.

#### Patriotic Endeavor.

The officials and employees of Rhodes, Curry Co., of Amherst, with their branches at Halifax, New Glasgow, and St. John, have contributed \$1,000 to a fund for the purchase of a machine gun for the Militia Department at Ottawa. The certified check for the amount has been forwarded.

For the collection of a million-dollar fund for the care of wounded Canadian soldiers a practical suggestion has been made by W. E. Roop, foreman in the woodworking department of T. S. Sims & Co., brush manufacturers, St. John. He has put forth the suggestion that every working man in Canada give one day's pay to the fund, and thinks that in this way enough could be raised for the purpose.

#### Contracts Let.

A. R. C. Clark & Son, of St. John, have been awarded the contract for the installation of water and sewerage in Bathurst, N.B. The contract covers about \$131,000, including the construction of a dam and pumping station, and about seven miles of water and sewage mains. A large stand pipe with a 405,000 gallon capacity is to be erected also.

E. W. Green has been awarded the contract for the erection of a new steel and concrete garage in Carleton Street, St. John. The site is 120 feet by 87, and it is reported that the purpose is to establish a line of jitneys here.

The contract for a new sewer in Lancaster has been given to Messrs. Kane & Ring. It represents an expenditure of about \$10,000.

W. J. Hunter, of Sussex, has been awarded the contract for the erection of a large dam at Campbellton for the Shives Lumber Co. It will be about 175 feet long and 32 feet high.

#### CANADA'S TRADE POSITION.

THE trade returns of the Dominion for the last fiscal year, just published, reflect the general trade restriction both before and during the war up to March 31 last. As compared with the preceding year, there was a net decrease of about 158 millions in the exports and imports of merchandise. Imports of merchandise fell off by nearly 163 million dollars as compared with 1914, while exports of merchandise showed an increase of a little more than four millions.

It is encouraging to note, however, that for the first time in many years the balance of trade for the year in regard to imports and exports of merchandise is in Canada's favor, the total imports being \$455,471,471, while exports are valued at \$461,442,509.

The movement of coin and bullion, which was abnormal following the outbreak of the war, of course swells the total figures very considerably. The imports of coin and bullion during the last fiscal year amounted to no less than \$131,992,992, as compared with \$15,236,305 for the preceding year.

#### British Imports.

Canada's imports from the British Empire for the year totalled \$116,272,787, a decrease of nearly forty millions as compared with the preceding year. Imports from Great Britain, which totalled \$90,085,840, fell off by nearly forty-two millions. Imports from the British West Indies, however, increased by nearly two millions. Imports of merchandise from the United States last year totalled \$296,632,506, a decrease of nearly a hundred millions.



### Exports to Britain.

Canada's exports to British countries during the year totalled \$237,558,704, a decrease of nearly ten millions, nearly all of which was in exports to the United Kingdom. As compared with this, Canada increased her sales of Canadian produce to the United States by some ten millions, the total for the year being \$173,320,798. During the year Canada bought from the United States 123 million dollars' worth of goods more than she sold to the United States. In the case of Great Britain, the Dominion sold 121 million dollars' worth of goods more than she bought.

The increase in exports of merchandise during the year was due solely to the increased transportation through Canada of foreign produce, which was greater by some twenty-eight millions than in the previous year, and was made up principally of horses, oats and wheat bought from the United States for war

purposes and shipped through Canadian ports.

### Canadian Produce Exports.

The exports of Canadian produce show a decrease of \$22,169,603. Exports of the mine decreased from \$52,039,054 in 1914 to \$51,740,989 for 1915; the fisheries from \$20,623,560 to \$19,687,068; agricultural products from \$198,220,029 to \$134,746,050.

On the other hand, exports of animal produce increased from \$53,349,119 to \$74,390,743, and of manufactures from \$57,443,452 to \$85,539,501. The increase in the exports of animal produce reflects, of course, the large sales to the United States of beef cattle following the taking down by the United States of the tariff barriers. The increase in the exports of manufactures is largely due to Canada's sales of war munitions to the allies.

### Foreign Trade.

The effects of the war are seen in the figures of the trade with France and

Germany. Imports from France last year totalled \$8,449,186, as compared with \$14,276,378. Exports to France totalled \$14,595,705, as compared with \$3,810,562 for the preceding fiscal year. From Germany Canada bought during the twelve months goods to the value of \$4,314,805, as compared with \$14,586,223 for the preceding year. To Germany Canada sold last year goods to the value of \$2,162,010, as compared with \$4,423,736 in 1913-14. The total trade of Canada with Germany in 1913-14 amounted to \$19,019,969. In 1914-15 it amounted to \$7,248,996. This year it will be nil.



The Quebec Streams Commission are having a large dam built above the La Loutre rapids by the St. Maurice Construction Co. The dam will cost \$1,425,000, and will probably be completed in 1918. Fraser, Braze & Co., of Montreal, will undertake the greater part of the work.

## CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

### CANADIAN TRADE COMMISSIONERS.

#### Argentine Republic.

H. R. Poussette, 278 Balcarce, Buenos Aires. Cable Address, Canadian.

#### Australasia.

D. H. Ross, Stock Exchange Building, Melbourne. Cable address, Canadian.

#### British West Indies.

H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

#### China.

J. W. Ross, 6 Klukiang Road, Shanghai. Cable Address, Cancoma.

#### Cuba.

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

#### France.

Phillippe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona

#### Japan.

G. B. Johnson, P.O. Box 109, Yokohama. Cable Address, Canadian.

#### Holland.

J. T. Litbrow, Zuiddlaak, 26, Rotterdam. Cable address, Watermill.

#### Newfoundland.

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

#### New Zealand.

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

#### South Africa.

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

#### United Kingdom.

E. de B. Arnaud, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

Acting Trade Commissioner, North British Building East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

Fred. Dane, 87 Union Street, Glasgow, Scotland. Cable address, Cantracom.

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

### CANADIAN COMMERCIAL AGENTS.

#### British West Indies.

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

#### Colombia.

A. E. Beckwith, c/o Tracey Hnos, Medellin, Colombia. Cables to Marmato, Colombia. Cable address, Canadian.

#### Norway and Denmark.

C. E. Sontum, Grubbeget No. 4, Christiansa, Norway. Cable address, Sontums.

#### South Africa.

D. M. McKibbin, Parker, Wood & Co., Buildings, P.O. Box 559, Johannesburg.

E. J. Wilkison, Durban, 41 St. Andrew's Buildings, Durban, Natal.

### CANADIAN HIGH COMMISSIONER'S OFFICE.

#### United Kingdom.


W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.

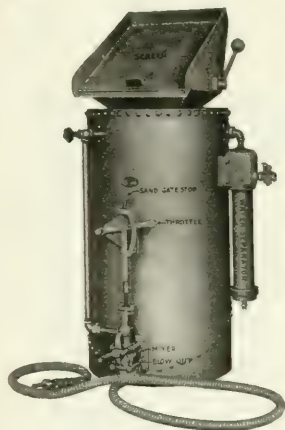


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ST. JOHN, N.B. TORONTO WINNIPEG VANCOUVER

*Canada's Leading Machinery House*





## Two Notable Labor-Saving Devices for Increasing Production

### ■ CURTIS SAND BLASTS

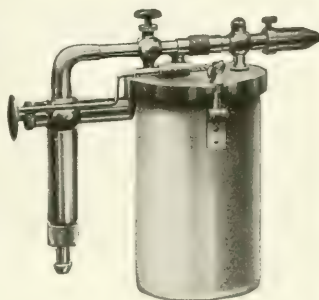
Have maximum abrasive action and embody many features that save time and labor not included in the design of other makes. For cleaning scale from shrapnel cases and preparing the interior of high explosives for varnishing.

Get information on the CURTIS JACK for handling hollow forgings for external or internal sand-blasting.

### THE ECLIPSE AIR BRUSH

For applying varnish to the interior of high explosives or painting the exterior, the Eclipse is unrivalled in the economy of material and time and labor-saving efficiency.

Get information on special motor-driven rotating stand for handling this work on a quantity basis.



**REMEMBER OUR SERVICE DEPARTMENT IS ALWAYS AT YOUR DISPOSAL**

**THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED**  
Machine Tool Department

# WHAT REASON HAVE YOU

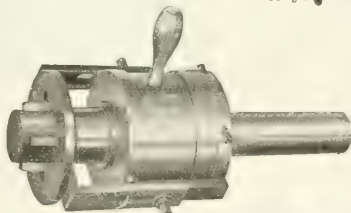
For not using a Geometric Collapsing Tap in tapping out holes above 3/4-inch diameter?

Your rate of production would be increased, and your cost of production decreased.

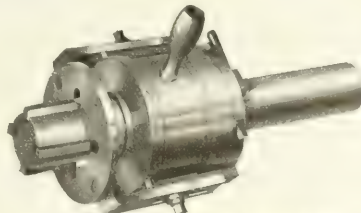
Geometric Collapsing Taps require no backing out over the threads. They are rigid while cutting, but collapse their chasers at the prescribed depth of thread.

It makes no difference what the thread is, a Geometric Collapsing Tap can be furnished that will produce it

to your entire satisfaction.



Geometric Collapsing Tap Arranged for Hand Tapping



Geometric Collapsing Tap Arranged for Machine Tapping

We will fit the tap with whatever size shank your machine requires. Send specifications of your work, and our experts will make a study of it and tell you what we can do for you. Look over our catalogue. Get in touch with us, at least.

**The Geometric Tool Company, New Haven, Conn., U.S.A.**

CANADIAN AGENTS:

Williams & Wilson, Limited, Montreal. The A. R. Williams Machinery Co., Limited, Toronto, Winnipeg, St. John, N.B.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



# INDUSTRIAL <sup>A</sup><sub>D</sub> CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News.

## Engineering

**Cobalt, Ont.**—The Coniagas Mining Co. will build a new cyanide mill.

**Mount Brydges, Ont.**—It is probable that an automobile factory will be built here.

**Galt, Ont.**—The Galt Machine Screw Co. has purchased a site in Jackson Park, and will build a new plant there.

**Chatham, N.B.**—The Maritime Foundry Co.'s new shell plant is under construction. The building is 100 x 40 feet.

**Walkerville, Ont.**—The Dominion Stamping Co. will make an extension to their plant.

**Goderich, Ont.**—The Doty Engine Co. have received an order for 4.5 high explosive shells.

**Berlin, Ont.**—The Central Heating Co. have ordered two 300 h.p. boilers from the Babcock & Wilcox Co.

**Winnipeg, Man.**—The city is contemplating making an extension to the power plant at the municipal hospital.

**Brampton, Ont.**—A company has been formed to make shells here. A factory building on Nelson Street will be utilized.

**Renfrew, Ont.**—It is reported that M. J. O'Brien is interested in a proposition to establish a factory here for making shells.

**Montreal, Que.**—The Canada National Gas Co. are calling tenders for the laying of a pipe line from the wells at St. Barnaby to the city of Montreal, a distance of 40 miles. The cost is estimated at about \$200,000.

## Electrical

**Peterborough, Ont.**—It is stated that the Hydro-Electric Commission will take over the Healey Falls dam, the property of the Seymour Power Co.

**Palmerston, Ont.**—The obtaining by-law for Ontario hydro-electric power was voted on here on Aug. 4, and carried almost unanimously. The projected line starts near Mitchell and supplies Milverton, Listowel, Palmerston, Harriston and Clifford. Milverton, Harriston and Palmerston have decided handsomely in its favor, and the other towns will likely

### CANADIAN GOVERNMENT PURCHASING COMMISSION.

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion \$100,000,000 war appropriation:—George Gault, Winnipeg; Henry Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the commission headquarters are at Ottawa.

do the same. Hydro is expected to be installed in December.

## General Industrial

**Kerrobert, Sask.**—The Federal Elevator Co. will build an elevator here. The contract has been let.

**Montreal, Que.**—The Consolidated Rubber Co. will make an extension to their factory on Notre Dame street.

**London, Ont.**—Beatty Bros., Ltd., will make an addition to their factory on York street at a cost of \$3,000.

**Port Arthur, Ont.**—The Barnett & McQueen Co., contractors, have commenced work on the new National elevator.

**Vancouver, B.C.**—The W. H. Malkin Co., wholesale grocers of this city, are

having plans prepared for the installation of up-to-date machinery for the manufacturing of their food products.

**Victoria, B.C.**—The Imperial Oil Co. bought five lots at Esquimalt, and has begun preliminary work for building an oil depot there. Storage facilities are to be erected and a wharf put up. A. M. Abbey represents the Imperial Oil Company.

**The Cowan & Britton, Ltd.**, plant at Gananoque, Ont., manufacturing butts, hinges and other shelf hardware, established 54 years ago by C. E. Britton and the late O. D. Cowan, has been purchased by the Canada Steel Goods Co., Hamilton, Ont.

**Winnipeg, Man.**—The establishment of big pulp mills and a pickle factory on the line of the Greater Winnipeg Water District railway is proposed by Controller Midwinter. The controller outlined his plan at a meeting of the board held recently.

## Municipal

**Vernon, B.C.**—The city council may install an auxiliary pumping station.

**Sherbrooke, Que.**—The city council have purchased a site for the new gas plant.

**Owen Sound, Ont.**—The council are considering the purchase of a motor hose wagon for the fire department.

**Lindsay, Ont.**—The Horn Bros' industrial by-law has been given the third reading by the council.

**Port Rowan, Ont.**—The installation of an electric lighting plant is contemplated by the town council.

**St. John, N.B.**—The city council are in the market for a quantity of cast iron pipe for water main extensions.

**Stratford, Ont.**—The town council contemplate purchasing about 1,800 feet of 6-in. cast iron pipe.

**Athens, Ont.**—The town council are considering installing an electric light and power plant.

**Beauceville, Que.**—The town council will call for tenders shortly on the construction of water-works, drainage and lighting systems. Engineer, F. Mignault, Sherbrooke, Que.

### ALLIES PURCHASING AGENTS. •

The Trade and Commerce Department, Ottawa, has published the following list of purchasing agents for military purposes for the allied Governments:—

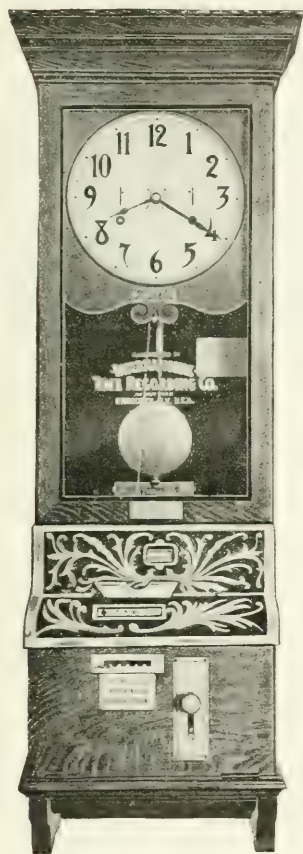
International Purchasing Commission, India House, Kingsway, London, Eng.

French—Hudson Bay Co., 56 McGill Street, Montreal; Captain Lafoulloux, Hotel Brevort, New York; Direction de l'Intendance, Ministère de la Guerre, Bordeaux, France; M. De la Chaume, 28 Broadway, Westminster, London.

Russian—Messrs. S. Ruperti and Alexsief, care Military Attache, Russian Embassy, Washington, D.C.

# The Canny Employer Says:

**"When you show me that the International Time Recording System will pay for itself—I'll buy it."**



**\$95**

is the price of this International Time Card Recorder. The best is always the cheapest.

That's the proper attitude to take, and that suits us.

Millions of employees throughout the world are recording themselves "on time" or "late" on International Time Recorders.

Millions and millions of dollars in wages are being paid out every week all over the world without any dispute or argument—without chance of mistake—because the International Time Recorder shows an indelible printed record of every man's time.

One of the most prominent customers remarked recently that there could be only one reason why every employer of labor does not use the International System, viz.—they do not realize what it costs to be without it.

No manufacturer can afford to let one cent of unearned wages get away from him in these times. The International Time Recording System is absolutely fair to employer and employee alike.

Why not let us send you TO-Day particulars of the System particularly suited to your business?

**International Time Recording Co. of Canada**  
LIMITED, TORONTO, CANADA

Offices: Ryrie Bldg.,  
Cor. Shuter and Yonge Sts.

F. E. MUTTON  
Manager

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## Rumely-Wachs Machinery Co.

121 N. JEFFERSON ST.

CHICAGO

ILLINOIS

New and second-hand machine tools in stock for immediate delivery:

### LATHES

- 18" (20" swing) x 8' Hamilton, C.R. H.S. (Used).
- 18" x 10' Rahn Carpenter, C.R. H.S. (Used).
- 21" x 10' Bradford, C.R. H.S. (Used).
- 22" x 12' Plather, C.R. H.S. (Used).
- 24" x 8' Putnam (Used).
- 24" x 8' Sherman (Used).
- 25" x 14' LeBlond, heavy duty (New).
- 30" x 14' American (Used).
- 30" x 12' Schumacher & Baye (Used).
- 36" x 16' Fifeid (Used).

### TURRET LATHES AND SCREW MACHINES

- Two 24" Morse Turret Lathes, with 1" hex. turret, on carriage (Used).
- No. 5 Bardons & Oliver (2") with wire feed, oil pump and pan (Used).
- Two Bardons & Oliver No. 2 Hand Screw Machines, plain head, (1") wire feed, oil pump and pan (Used).

### PLANERS

- 30" x 30" x 8' Flather, one head (Used).
- 36" x 36" x 8' American, two heads (Used).
- 36" x 36" x 15' Woodward & Powell Frog and Switch, two heads (Used).

### SHAPERS

- 20" Gould & Eberhardt, back-geared, crank (Used).
- 16" Stockbridge crank (Used).
- 14" Acme, crank (Used).

### DRILL PRESSES

- 21" Cincinnati, B.G. and power feed (Used).
- 21" Hoefler, b.g. power feed (Used).
- 22½" Barnes, b.g. power feed (Used).
- 24" Cincinnati, sliding head, complete (Used).
- 24" Sibley & Ware, sliding head, complete (Used).
- 28" Barnes, sliding head, complete.
- 28" Sibley & Ware, sliding head, complete (Used).
- 31" Barnes, sliding head, complete (Used).
- 4½" Blackford Plain Radial (Used).
- 5" Prentice Plain Radial (Used).

### MILLING MACHINES

- No. 2 Brown & Sharpe, plain (Used).
- No. 2 Kempsmith, plain (Used).
- No. 2-H Brown & Sharpe, plain (Used).
- No. 3 Pratt & Whitney, plain (Used).
- No. 3 Kempsmith, plain (Used).
- No. 3 Cincinnati, plain (Used).
- No. 3 Newton, plain (Used).
- No. 3 Owen, Universal (Used).

### MISCELLANEOUS

- No. 22 Espen-Lucas Cold Saw, capacity 6" (Used).
- No. 15 Lea Simplex Cold Saw, capacity 5" (Used).
- 42" Colburn Boring Mill, 2 heads (Used).
- 42" Bullard Boring Mill, 2 heads (Used).
- 30" Bullard Boring Mill, one turret head (Used).
- 1½" Acme Bolt Cutter (Used).
- 2½" Acme Bolt Cutter (Used).

**Toronto, Ont.**—It is estimated that it will cost between four and five million dollars to rebuild the Morley avenue sewage disposal plant.

**Collingwood, Ont.**—A by-law will be submitted to the ratepayers to authorize a loan of \$20,000 to the Bryan Mfg. Co. to rebuild their factory.

**Sherbrooke, Que.**—The Gas and Electric Committee have decided to purchase a motor truck from the Andover Motor Vehicle Co. at a cost of \$1,860.

**Tavistock, Ont.**—J. G. Field has accepted an offer from the council of \$3,000 for his electric light plant. Hydro power will be installed in the town.

**Winnipeg, Man.**—The city council contemplate extensions to the gas distribution system. A considerable quantity of cast iron pipe may be required.

**Elmira, Ont.**—The town council are considering the installation of a sewage system, estimated to cost \$25,000. Engineer, H. J. Bowman, Berlin, Ont.

**The Pas, Man.**—The town council is considering the installation of a water-works and sewage system, estimated to cost \$80,000. H. H. Elliott, clerk.

**Dorchester, Ont.**—A by-law has been passed granting a franchise to the Southern Ontario Natural Gas Co., and permitting the laying of gas mains in the municipality.

**Petrolia, Ont.**—The power by-law and the one authorizing the raising of \$35,000 for installing a hydro power plant were finally passed by the town council at a meeting held recently.

**Chatham, Ont.**—The Hydro-electric Commission has submitted a proposal to the city for using hydro power at the civic pumping plant. The scheme includes the purchase of two centrifugal pumps and motors. Total cost is estimated at \$3,000.

**Brockville, Ont.**—The Light and Water Commissioners have instructed that plans and specifications for filtration and intake be sent to the Provincial Board of Health, Toronto. These are the plans made some time ago. It was also authorized that a new set of plans be prepared by G. Bryson, town engineer, and E. J. Philip, manager, covering the whole proposition for intake and filtration. The approval of the department will be sought as to the best method.

## Contracts Awarded

**Hamilton, Ont.**—The Dominion Sheet Metal Co. have awarded the building contracts for their new factory.

**Toronto, Ont.**—Purdy, Mansell, Ltd., have been awarded a contract by the Board of Control for a steam pump.

**A. R. C. Clark & Son**, of St. John, N.B., have been awarded the contract for the construction of a sewerage system.

**The Jenckes Machine Co.**, Sherbrooke, Que., will supply and erect a steel water tank for the town of Bedford, Que., at a cost of \$4,675.

**The Chatham Bridge Co.**, Chatham, Ont., have been awarded a contract for pumping machinery by the Chatham Township Council.

**Brockville, Ont.**—The Light and Water Commissioners have passed a resolution accepting the tender of the Donnelly Wrecking Co. for laying the intake under water for \$4,973.

**Toronto, Ont.**—The Toronto Hydro-Electric Commission has awarded a contract for the supply of 1,000 feet of conductor cable at 42 cents a foot to the Eugene Phillips Electric Co. of Montreal.

## Tenders

**Ottawa, Ont.**—The city council will proceed with the installation of an incinerator. Tenders are being received until Aug. 26. F. C. Askwith is city engineer, from whom particulars may be obtained.

**Regina, Sask.**—Tenders will be received by the City Commissioners up till Monday, September 6th, 1915, for the supply, delivery and erection of a 7,000,000 gallon pumping unit at the city power house. Specifications and other information may be obtained from J. M. MacKay, Superintendent of waterworks, Regina, Sask.

**Toronto, Ont.**—Tenders, addressed to the secretary-treasurer of the Board of Education, will be received until Tuesday, August 17, 1915, for all trades for enlargement of Eglinton Public School, also heat regulators and sundry trades in other schools. Specifications may be seen and all information obtained at the office of the superintendent of buildings, City Hall, Toronto.

**Burlington, Ont.**—Tenders will be received by the secretary of the Board of Water Commissioners until Monday, August 23rd, 1915, for the construction of a reinforced concrete gallery and connections thereto. Plan and specification may be seen at the office of the Water Commissioners, Burlington, or at the office of the engineers, Chipman & Power, Mail Building, Toronto.

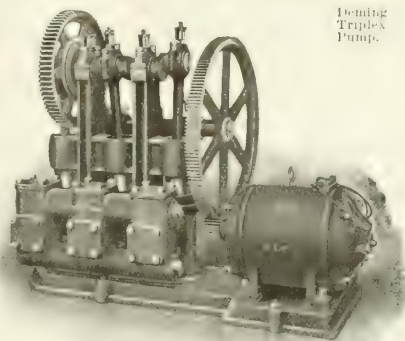
# Are You Making Shells?

Good pumping machinery is essential to the greatest output. We manufacture steam and power pumps for every kind of service.

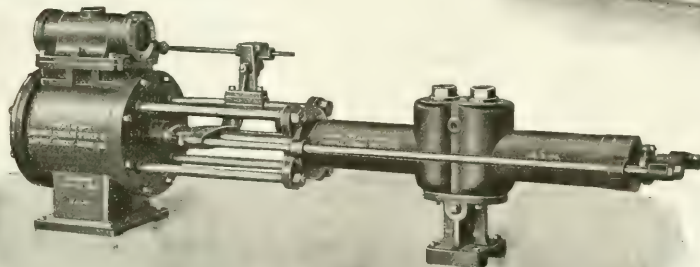
## Darling Brothers Limited

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MADE IN CANADA



Bending  
Triplex  
Pump.



Barham Hydraulic Pump

We are  
manufacturing  
special machines  
used in shell  
making.

**TELL US WHAT  
YOU NEED.**

## LATHES AND TURRET LATHES IN STOCK.

- 2-10" x 4' South Bend.
- 1-11" x 4' Monarch.
- 1-12" x 6' Blaisdell.
- 1-14" x 6' Wright & Smith.
- 1-14" x 10' LeBlond.
- 1-15" x 6' Kelly.
- 1-15" x 6' Johnson.
- 1-15" x 12' Carroll.
- 1-15" x 8' Kelly.
- 1-18" x 10' L. & J. & Davis, red feed.
- 1-20" x 14' Sellers.
- 2-22" x 10' Bend.
- 1-24" x 14' Motch, double spindle.
- 1-26" x 13' Bement.
- 1-26" x 17' Johnson.
- 1-27" x 22' Pratt & Whitney.
- 1-28" x 14' Finfield.
- 1-30" x 18' Bement.
- 1-33" x 12' Gap, swings 55° when open.
- 1-50" x 16' Pittsburgh Machine Tool Co. blocked to 62°.
- 1-50" x 27' New Haven.
- 1-84" x 30' Bement.

### TURRET LATHES

- 2-1" Bardous & Oliver, automatic chucks.
- 1-14" Bardous & Oliver wire feed screw machine.
- N. & C. Pratt & Whitney wire feed screw machine.
- 12" x 66" Warner & Swasey double head key lathe.
- 14" x 4' Dresser lathe, with cut-off slide.
- 14" x 5' Warner & Swasey lathe.
- 15" x 5' Johnson turret lathe.
- 16" x 5' Windsor turret lathe, with cut-off slide.
- 22" x 8' Ames.
- 40" Conardson turret lathe, 33 1/4" hollow spindle.

**FRANK TOOMEY, Inc.**

127-131 N. Third St., Philadelphia, Pa.

## WINNING THE BUYER'S FAVOR

**T**HE best possible buyer is not made an actual buyer at a single step. It is one thing to win the buyer's favor for an article and another to make adjustments incident to closing the sale. Winning the buyer's favor is the work of trade paper advertising. Under ordinary conditions it should not be expected to do more.

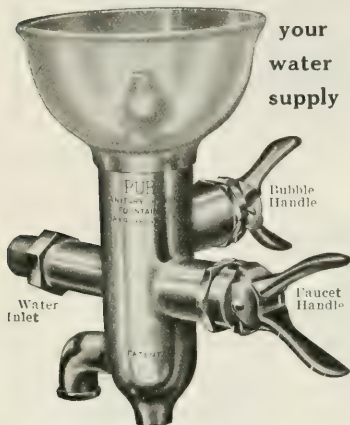


**OUTGROWN EQUIPMENT** Lathes, Planers, Drill Presses, Belt Cutters, Grinders, Blowers, Key Seaters, Millers, Steam Hammer, Punch Presses, Wood-working and Tinsmith's Machinery. Send for descriptive list. Attractive prices prompt deliveries.

**Port Huron Engine & Thresher Co.**  
PORT HURON, MICH.

## "PURO - FY"

(MADE IN CANADA)



your  
water  
supply

THE American Museum of Safety conferred a Gold Medal Award upon the First Sanitary Drinking Fountain at the First International Exposition of Safety and Sanitation.

The Puro Sanitary Drinking Fountain won because it deserved to win—Puro had merits that made it stand head and shoulders above any other drinking apparatus.

**Safe Sanitary**      **Simple Economical**  
**Quickly Attached**

These are the qualities that forced the leading safety and sanitary engineers to pick Puro in preference to all others. No device can be as efficient that does not contain all these qualifications, and Puro was not tied for first place; Puro was first. Don't be satisfied with half-way goodness, or makeshift drinking arrangements for your employees.

If the men in your factory must drink, give them a clean drink. Puro is clean it does not rust or corrode. Puro is economical. It allows just the proper amount of cool, clean, fresh water to come through the bubbler. No spurring, no overflowing, no loss. Puro regulates itself. You can attach it in five minutes. Tell us how many men in your factory and your water pressure in pounds. We'll tell you just what it will cost to "PUROFY" YOUR WATER SUPPLY.

**PURO** **SANITARY DRINKING FOUNTAIN CO.**

TRADE MARK  
147 University Ave. TORONTO, ONT.

KINDLY MENTION  
THIS PAPER WHEN  
WRITING TO AD-  
VERTISERS.

Drumheller, Alta.—Tenders will be received up till Monday, August 16, 1915, for the following contracts: (1) Supply of about one mile of 6-in. and 4-in. steel or cast iron pipe; (2) valves and hydrants; (3) One return tube boiler and stack; (4) One duplex pump; (5) Materials for 30,000-gallon wood tank and housing; (6) All labor and certain materials for laying water mains, sinking an open well, constructing pumping station, and erecting wood tank and housing. Plans and specifications and other information may be obtained at the offices of the John Galt Engineering Co., Ltd., consulting engineers at Winnipeg and Calgary.

## Personal

L. S. Hawkins, chief engineer of the Marconi Wireless Co., of Canada, is visiting Port Arthur, Ont.

David A. Thomas, representative of the British Government, and Gen. Mahon, ordnance expert, have been visiting the Maritime Provinces.

Sir Charles Ross, president of the Ross Rifle Co., Quebec, has been given the temporary rank of colonel in the Canadian militia, according to militia orders just issued.

R. O. McCulloch, secretary-treasurer of the Goldie and McCulloch Co., Ltd., Galt, Ont., has been appointed a director of the Union Bank of Canada.

C. H. Webster, formerly secretary of the Calgary Board of Trade, has been appointed secretary of the Western section of the Canadian Manufacturers' Association.

E. W. Knight, until recently with Frankel Bros., Toronto, has opened an office in the Stair Building, Bay street, Toronto, and will carry on a metal business.

Andrew Malcolm, president of the Andrew Malcolm Furniture Co., Kincardine, Ont., died at his home there on Aug. 9. The deceased was born at Kincardine, Scotland, 75 years ago, and came to Canada in 1867, settling in Kincardine in 1874.

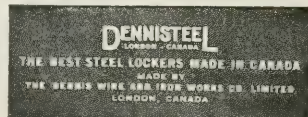
A. M. Mosley, who for the past few years has been manager of the National Tube Works at Fort William, Ont., has left for Guelph, Ont., where he will assume a similar executive position with the Page-Hersey Co., an affiliated concern.

C. E. Austin, general manager of the Moose Jaw Mills, Ltd., has been appointed general manager of the Dominion Government interior storage elevators between Fort William and Vancouver, with headquarters at Fort William, Ont.

## Classified Advertisements

Those who wish to sell or buy a business, obtain competent help, connect with satisfactory positions, or secure aid in starting new enterprises, should not fail to use the Want Ad. Page of "CANADIAN MACHINERY."

**WANTED — EQUIPMENT FOR MACHINE** (repair) shop; weight or accuracy not important as price. Give full details. Box 153, Canadian Machinery. (8)



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In all countries. Ask for our Inventor's Adviser, which will be sent free.

**MARION & MARION, 364 University St.**  
Merchants Bank Building, corner St. Catherine St., MONTREAL, Phone UP 6474 and Washington, D.C., U.S.A.

## IMMEDIATE DELIVERY

### ENGINE AND TURRET LATHES.

- 14" x 5' Putnam engine lathes (2).
- 16" x 6' Flather engine lathes (3).
- 16" x 8' Flather, taper attach.
- 18" x 6' Barker engine lathes (6).
- 18" x 8' Barker engine lathe.
- 20" x 10' Porter engine lathe.
- 24" x 14' Bradford engine lathe.
- 28" x 12' Fifield engine lathe.
- 2 x 24 Jones & Lamson turret lathe.
- 26" Duper turret lathe, 4" hole.
- 28" Pond rigid turret lathe.
- 30" Lodge & Shipley turret lathe.
- 2" Bardons & Oliver screw machine.
- 21" Pearson screw machine.
- Several Automatics, all sizes.

### MILLING MACHINES.

- Whitney hand millers (13).
- No. 3 Fox hand and power millers (2)
- No. 12 Garvin hand and power (3).
- No. 1 Brown & Sharpe plain millers (6).
- No. 9 Kempsmith, plain.
- Grant manufacturing miller.

Above, partial list only.

**A.D. White Machinery Co.**  
108-114 N. Jefferson St., CHICAGO

## TO THE USER OF WRENCHES

Users of Wrenches, both Pipe and Monkey Wrenches, will find economy in buying the Trimo makes. A new standard of quality has been set by Trimont Mfg. Company, the makers of these improved wrenches.

Be sure to ask for the Trimo Wrenches, both Pipe and Monkey, which are all-steel goods. They are equipped with Nut Guards that prevent the accidental turning of the adjusting nut in close quarters, and with Steel Frames, in the principal sizes that will not break.

These new Trimos are worth more to the user because of these improvements. Ask for the genuine and take no other. Don't let unfair dealers pass out the imitation on you. The name Trimo is on every Trimo tool.

Very truly yours,

TRIMONT MFG. COMPANY,

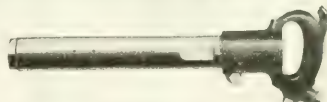
Roxbury, Mass.

## CLEVELAND RIVETING, CHIPPING, CALKING AND BEADING HAMMERS

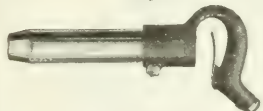
MOST POWERFUL AND EFFICIENT AIR TOOLS ON THE MARKET



Cleveland Riveters are made in 20 styles and sizes with driving capacities of  $\frac{1}{4}$ -in. to  $1\frac{1}{2}$ -in. rivets in Boilers, Tanks, Stacks, etc.

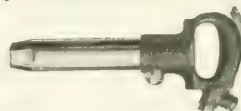


They have an enviable record for durability and economy in service.



### CLEVELAND CHIPPING HAMMERS

are made in 20 styles and sizes to suit all classes of work. They are ideal tools for foundries, as they have high speed, no recoil and are practically dust-proof.



In stock: Riveting and Chipping Hammers, Air Drills, Corner Drills, Sand Rammers, Portable Grinders, Bowes Couplings, Chisels, Rivet Sets, etc.

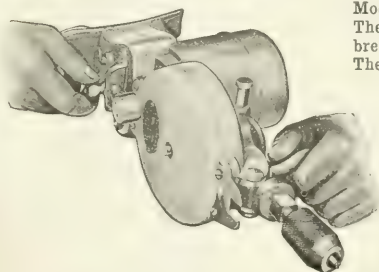
### PORTABLE ELECTRIC DRILLS

Model "B" Drill illustrated, shows compactness of design. The Casing, Switch and Gear Covers are aluminum; the breast plate, motor-head and handle supports are of steel. The machine is light in weight, convenient in shape; has high speed; operates on either A.C. or D.C. currents and runs either forward or reverse as desired. Model "C" has two speeds and in construction is similar to Model B.

Bulletins mailed on request.

**Cleveland Pneumatic Tool Co.  
of Canada, Limited**

80 Duchess Street, - Toronto, Ont.



*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



## Make Your Own Engravings

It doesn't take an expert to operate the GORTON ENGRAVING MACHINE. The ordinary workman can turn out lettering or designs either sunk or in relief, on dies, moulds, tools, patterns, core boxes, label plates, instruments, etc., etc., better than the most skilled hand engraver in the fraction of time the hand workman would take.

WRITE FOR DETAILS.

Geo. Gorton Machine Co.  
RACINE, WIS.



## SHEET METAL STAMPINGS

### Automobile Fenders, Hoods and Gasoline Tanks

We are now manufacturing a number of lines for Canadian firms filling war contracts.

The quality of our production is one grade — THE BEST. Our facilities and equipment enable us to give a very attractive price and prompt service.

### The Dominion Stamping Co.

LIMITED

Walkerville, Ont.

## DROP FORGINGS

## Trade Gossip

**Collingwood, Ont.**—The Imperial Steel & Wire Co. have closed a large contract for wire and nails.

**The Hamilton Bridge Works, Hamilton, Ont.**, will supply the steel work for the T. Eaton Co. factory.

**Ottawa, Ont.**—It is reported that the Government contemplate installing shoe machinery in the prison workrooms.

**The Goldie & McCulloch Co., of Galt, Ont.**, have offered a gift of \$5,000 to the Canadian Government for war purposes.

**The Storey Pump and Equipment Co., New York**, have been awarded a contract for pumps by the town of Stratford, Ont.

**The International Engineering Works, Toronto**, have sold a 12-6-12 in. outside end packed boiler feed pump for the Toronto Island filtration plant.

**The Canadian Sarco Engineering Co., Winnipeg**, has been awarded a contract by the municipality of Assiniboia, Man., for the supply of 193 Chapman gate valves at \$3,500.

**St. Andrews, N.B.**—The sardine factory at Chamcook, four miles from St. Andrews, has resumed operations after having been closed for the last year. Recently the entire plant and equipment were purchased by the Lane-Libby Fisheries Co., of Boston, Mass.

**T. MacAvity & Sons of St. John, N.B.**, have offered to place at the disposal of the War Office the site and preliminary work on a new plant on Marsh road, on which \$10,000 has already been expended. D. A. Thomas, to whom the offer was made, has the matter under consideration.

**Orillia, Ont.**—The Orillia smelter has begun the treatment of molybdenum. This rare metal is used for hardening steel in connection with the manufacture of guns and other armament. The ore, which is a substitute for nickel, is found in Renfrew County, but it has not been treated in Canada previously.

**The Toronto Hydro-Electric Commission** has decided that \$1,300,000 would have to be provided to carry on necessary extensions and liquidate some of the accounts owing the city. It was pointed out that money would be required to place the Interurban system, recently taken over, in a satisfactory condition.

**Canadian Car & Foundry Contract.**—The New York Journal of Commerce reports that the Canadian Car & Foundry Co., which early this year received a contract, valued at \$83,000,000 from the Russian Government calling for a large

## METAL STAMPINGS

We are manufacturers of stamped parts for other manufacturers.

We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

**W. H. BANFIELD & SONS**  
120 Adelaide St. W., Toronto

## STEEL

Bars

Plates

Shapes

Hoops

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AGENTS FOR

**Cambria Steel Co.**

**A. C. Leslie & Co., Limited**  
Montreal



**AMERICAN PULLEY COMPANY**

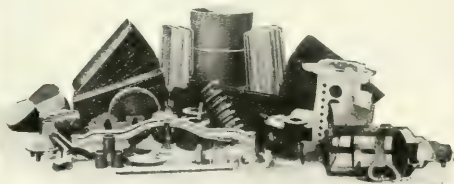
As additional machine tools are installed, new power transmission machinery looms up as important. The AMERICAN PULLEY COMPANY maintains a constant stock of steel-split pulleys—50,000 of them for immediate shipment. Sizes from 3" to 72". These pulleys are 20 year-old successes, and over 24 million have been marketed. Drop us a line today for a rapid fire execution of your wants.

**American Pulley Company,** Main Office and Works, Philadelphia, Pa.  
 Chicago      Seattle      Boston      New York  
 Montreal, Williams & Wilson, Ltd.  
 Winnipeg, Toronto, Vancouver, St. John, N.B., The A. R. Williams Machinery Co., Ltd.

**AMERICAN PULLEYS**  
*Steel Split*

## A FEW ARTICLES

*Including Steel, Aluminum, Cast Iron, Malleable Iron, Brass, Copper and Sheet Steel that have been*



### WELDED BY OUR OXY-ACETYLENE PROCESS

With our welding outfits on the job, you will increase the productiveness of your plant and save many an expensive machine part from the scrap heap.

**The Approximate Cost of Oxy-Acetylene Welding:**  
 Oxygen at 3 cents per cubic foot—  
 Acetylene at 1 cent per cubic foot—  
 nothing as compared with service rendered.

LET US PUT FULL DETAILS BEFORE YOU NOW. Send in your request for same now—you've nothing to lose and much to gain.

**The Metals Welding Co.**  
 CLEVELAND, OHIO

In Anaconda  
 you have  
 greater belt-  
 ing efficiency  
 service and economy for  
 your money than in any  
 other belting of any kind.



This statement is made without reserve and the proof will be more profitable to you than to us.

### ANACONDA BELTING

Let us help you solve your belting troubles.

**Main Belting Co. of Canada**  
 Limited  
 10½ St. Peter St., Montreal

WATCH FOR OUR MESSAGE IN NEXT WEEK'S ISSUE.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



# IMMEDIATE DELIVERY

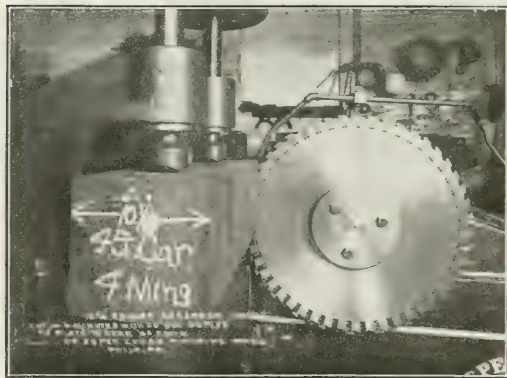
We always carry a large stock of machine tools for general manufacturing purposes, and solicit inquiries requiring prompt delivery.

We call attention to the following, on which we will quote attractive prices. All in thoroughly first-class condition:

- Three 36" Fellows Gear Shapers.
- Two 36" Brown & Sharpe turret head vertical boring mills.
- One 30" throat Putnam heavy punch and shear, capacity 1" hole in 1" plate.
- One 72" King vertical boring mill with two heads.
- One 48" Bement car wheel borer with crane.
- One 38" Baush vertical boring mill, two heads.
- One 39" Niles vertical boring mill, two heads.
- Two 36" Snyder upright drills, power feed, etc.
- Two 5" Bickford radial drills.

## Girard Machine and Tool Co.

491-493 N. Third Street, Philadelphia, Pa.



### Circular Metal Cutting Saw Blades for Any Type of Machine

Let us demonstrate what a saving can be made by installing a  
**HUNTER "DUPLEX" Inserted Tooth Blade**

Write for information

**HUNTER SAW & MACHINE CO., Pittsburgh, Pa., U.S.A.**

## THIS POSITION IS VACANT

If you will take it for one year it will only cost you  
**\$2.25 Per Insertion.**

Write for rate card and full particulars to

**CANADIAN MACHINERY & MANUFACTURING NEWS**  
143 University Avenue, Toronto

quantity of shrapnel and high explosive shells, has had the original order raised to the sum of \$154,000,000.

**C.P.R. Taking Over Allan Line.**—The C.P.R. Company is taking over the Allan Line steamship business, beginning October 1, this year, a new corporation having been organized in Montreal for this purpose under the name of the Canadian Pacific Steamships, Limited. George M. Bosworth, vice-president of the C.P.R. Company, is the president of the newly-formed Canadian Pacific Steamships, Limited, and H. Maitland Kersey is to be the managing director, with his office in London, England. The new company is to take over all the ocean steamships now operated by the C.P.R. Company and the Allan Line, and the head office will be in Montreal. Messrs. G. M. Bosworth, I. G. Ogden, E. W. Beatty, K.C., vice-president of the C.P.R. Company, and F. E. Meredith, K.C., were the directors in attendance at the organization meeting.

## Book Reviews

"The Coking of Coal at Low Temperatures, with Special Reference to the Properties and Composition of the Products," by S. W. Parr and H. L. Olin, has been issued as Bulletin No. 79 of the Engineering Experiment Station of the University of Illinois. This report covers a series of studies made in continuation of the work on the coking of coal at low temperatures, described in Bulletin No. 60. Coke resulting from the low temperature process contains from 18 to 22 per cent. of volatile matter but retains none of the tar forming constituents. In domestic appliances it kindles readily and burns with a bright, smokeless flame. A suction gas-producer test made with this fuel compared favorably in ease of operation and efficiency with similar tests of anthracite. The tar has a specific gravity of 1.069, contains less than 2 per cent. of free carbon and is rich in low boiling substances, many of which are suitable for use in internal combustion engines. Its adaptability to wood preservation processes is shown by its high content of tar acids, which constitute nearly 30 per cent. of the crude material. The pitch residue amounts to 30 per cent. and is low in precipitated carbon. Naphthalene is absent. Results of these studies show that the coke, tar, and gas have specific properties of especial value, and indicate that the process of coking at low temperatures could be established successfully on a commercial basis. Copies of Bulletin No. 79 may be obtained gratis upon application to C. R. Richards, Acting Director of the Engineering Experiment Station, University of Illinois, Urbana, Ill.



# HINTS TO BUYERS



## Genuine Armstrong Stocks and Dies

Hinged Pipe Vises.

Pipe Cutters. Steam and Gas Fitters' Tools.

Pipe Machines for Threading Pipe.

Either Hand or Power.

Manufactured by

**THE ARMSTRONG M'F'G CO.**

328 KNOWLTON ST. BRIDGEPORT, CONN.  
NEW YORK, 248 CANAL ST.



## Gives Satisfaction Where Other Metals Fail

Sold by Leading Dealers Everywhere,  
or by

**MAGNOLIA METAL CO.**

Office and Factory:

225 St. Ambrose St., Montreal



## You can afford to use High-Speed Steel in Armstrong Planer and Shaper Tools



They require no forging  
Minimum of  
Grinding and  
Mighty Little  
Tool Steel.

Our complete line is on exhibition in Block 41,  
Palace of Machinery, Panama-Pacific Exposition,  
San Francisco.

Catalog sent for the asking.

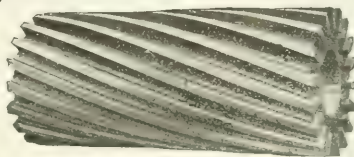
**ARMSTRONG BROS. TOOL CO.**

"The Tool Holder People"

306 N. Francisco, Chicago, U.S.A.

## Taylor-Newbold Milling Cutters

Fast  
Cutting  
Power-  
ful



Inserted  
Helical  
Blades  
of High-  
Speed  
Steel

FOR

Service—Utility—Strength—Power

4-in. DIAMETER FOR GENERAL USE

Write for Bulletin R. P.

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PHILADELPHIA, PA., U.S.A.

## SHAFTING

Cold Drawn, Turned and Polished Steel,  
Rounds, Squares, Hexagons and Flats,  
Steel Piston Rods, Pump Rods.

Special facilities for Keyseating up to 6 in. diameter.

THE

**Canadian Drawn Steel Co.**

Limited

Hamilton

Canada



**Allen**

## Safety Set Screws

Any length, point or thread. We make a specialty of short lengths.

**ALLEN SOCKET CAP SCREWS**

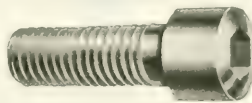
are very neat in appearance and exceedingly strong.

Send for circular No. 3 and free sample screws.

**The ALLEN MFG. CO.**

Hartford, Conn.

173 Princess St.,  
Manchester, England



If what you want is not advertised in this where you saw his advertisement—tell him.



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#### GEAR & MACHINE CO.

Cor. Concord  
& Van Horne

TORONTO



High-grade gears are the best value per dollar at first cost.

## THE DUPONT

Patent

### Power Hammer

BEST FOR Durability, Economy of Power, Simplicity of Adjustment.

Seven Sizes  
from 35 to 300 lbs.

Only High-Class Material Used and Satisfaction Guaranteed.

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Plessisville, Que.

Ontario and Western Agents:  
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## The Garvin Machine Co.

Manufacturers of

Milling Machines; Profiling Machines; Cam Cutting Machines; Screw Machines; Monitor Lathes; Die Slotting Machines; Screw Slotters; Tapping Machines; Duplex Horizontal Drills; Gang Drill Presses; Four-Head Right-Angle Drills; Wrenchless Chucks; Spring Coilers; Cutter Grinding Machines; Surface Grinders; Hole Grinders; Hand Lathes and Special Machinery.

We Want All To Have Our Catalog—Send For It To-day.

Spring and Varick Streets NEW YORK CITY



## A BALATA BELTING

Which We Guarantee  
Second To None  
And Entirely  
Satisfactory

Try One And Be Convinced

J.C. McLAREN BELTING CO.  
Limited  
MONTREAL TORONTO WINNIPEG

TRADE MARK  
THE J.C. McLAREN BELTING CO. LIMITED

## If YOU are Making SHRAPNEL

You need a



Indicating or Recording  
PYROMETER

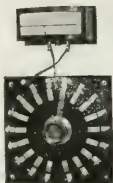
It will insure the metal being treated at the right temperature. Don't take any risks.

Write for Bulletins Nos. 6 and 7.

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441 N. 5th St., Philadelphia, Pa.

Canadian Representative:  
JAS. DE VON, 227 Davenport Road, Toronto, Ont.



## HIGH-GRADE Iron Working Machinery

Specially adapted for manufacturing

## WAR AMMUNITION

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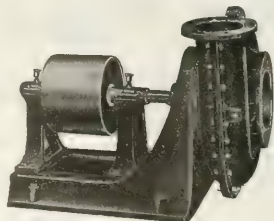
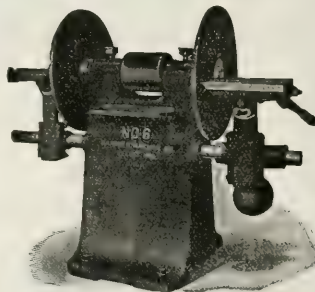
Canada Machinery Agency

298 St. James Street, Montreal

## Gardner Disc Grinder

Gardner Disc Grinders are made in all sizes, types and combinations. We can successfully meet any disc grinding problem in existence. Largest builders of Disc Grinding machinery in the world.

Gardner  
Machine Co.  
The Disc Grinding  
Authorities  
BELOIT, WIS.  
Canadian Agents: A. R.  
Williams Machinery Co.



If you require  
a thoroughly  
high-class,  
Made-in-Canada  
Pump

for any service,  
it will pay you to correspond with

The Smart-Turner Machine Co., Limited  
HAMILTON, CANADA

*The advertiser would like to know where you saw his advertisement—tell him.*

## For Hardness Testing

in shop and laboratory use the  
**Standard Scleroscope**

Universally adopted, direct reading,  
inexpensive and the only instrument  
that gives work, setting of work  
in all parts of the world  
this solving problems of coloring  
materials for specification.

BOOKLET FREE

## Heat Indication

**THE PYROSCOPE** is the exact thing. The **PYROSCOPE** is optical means is fast becoming the exact thing. The **PYROSCOPE** has solved the problem. (See)  
Perfect constant, inexpensive, no electricity used. Built  
to stand rough usage and upon common sense lines. Used  
by the Government and best firms.

Shore Instrument & Mfg. Co. 555-7 W. 22nd St. New York  
Agents for Canada: A. R. Williams Machy. Co., Ltd., Toronto, Can.

# PRESSES FOR SHRAPNEL

## HYDRAULIC PRESSES

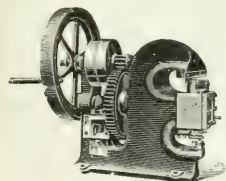
**For Nosing and Banding**  
Hydraulic Presses for all purposes. Hydraulic Pumps and  
Accumulators.

**FORGING PRESSES.**  
Drop a card for full details.

William R. Perrin  
Limited  
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## SPECIALISTS IN

## PUNCHING and SHEARING MACHINES.



**Beech Hill, - HALIFAX, - England.**  
TELEPHONE 116. Established 1850.

**PLATE BENDERS**  
and other Boiler Makers'  
Tools in Stock or  
Progress

CONSULT US.

**SCOTT BROS.,**

## DWIGHT SLATE MARKING MACHINE

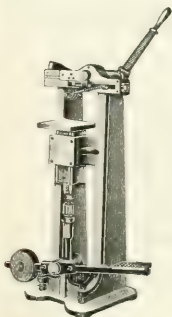
For Marking Shrapnel Shells

or they will mark any article,  
either round or flat. Power or  
Hand Machines recommended.

Steel Stamp and Die Cutting by  
expert engravers.

Send for Catalogue.

**Noble & Westbrook Mfg. Co.**  
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## PRESSES—ALL TYPES

Press Attachments, Automatic.  
Metal and Wire Forming Machines.  
Tumblers—Large Line.  
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Special Machines.

**Baird Machine Co., Bridgeport, Conn.**



**Detective and Stop Watch Combined.**

"We have a counter on every one of our presses, even the foot presses." This from a satisfied user of our counters. If you use presses our counters would save you money. Ask for catalog 35.

**The C. J. ROOT CO., 125 Bridge Street, Bristol, Conn.**



## NORTON JACKS

For all kinds of heavy lifting

Send for complete catalogue showing 50 styles  
10 to 100 tons capacity.

Made only by

**A. O. NORTON, LIMITED**

Coaticook, Prov. Quebec Canada

# PULLEYS

ALL WOOD—COMBINATION—IRON—STEEL

Every pulley fully guaranteed.

Write for interesting printed matter.

**The Positive Clutch & Pulley Works, Ltd.**  
Montreal Factory: Aurora, Ont. Toronto

## 20 TIMES THE SERVICE

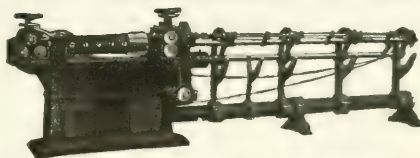
That's what this self-hardening, high-speed steel chaser does for the LANDIS DIE. Four long cutters tangentially disposed to the work carried in suitable holders make an ideal cutting condition. This, along with its many other distinctive characteristics, has established for us a world-wide reputation.

WRITE FOR CATALOGUE NO. 21.

**Landis Machine Co., Waynesboro, Pa.**  
Exclusive Canadian Representatives,  
Williams & Wilson, Montreal, Canada.



$\frac{1}{16}$  Page \$1.60 per insertion  
on yearly order.



## THE WIRE IS PERFECTLY STRAIGHT

and cut to accurate lengths when it comes from our **ATTO-MATIC WIRE STRAIGHTENING AND CUTTING MACHINE**, whether it's 3/4" diameter or only 0.20" wire, hard or soft wire, highly polished or rough stock.

May we send you catalogue C?

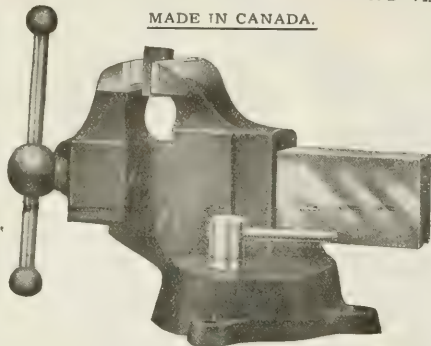
**The F. B. SHUSTER COMPANY, New Haven, Conn.**  
Formerly John Adt & Son, Established 1898.  
Also makers of Riveting Machines, Sprue Cutters, Cotter Pin  
Machines, etc.



# The YOST

**Solid Jaw and Swivel Bottom Machinist's Vise**

MADE IN CANADA.



A vise with a grip like grim death; a durability that defies time and the hardest usage.

A vise that will give you a lifetime of perfect service and satisfaction. The metal in a Yost Vise is of faultless quality, perfectly distributed and the workmanship is

## **Incomparably Good**

The National catalog would certainly interest you. Write us, asking for a copy.

**National Machinery & Supply Co., Ltd.**

HAMILTON

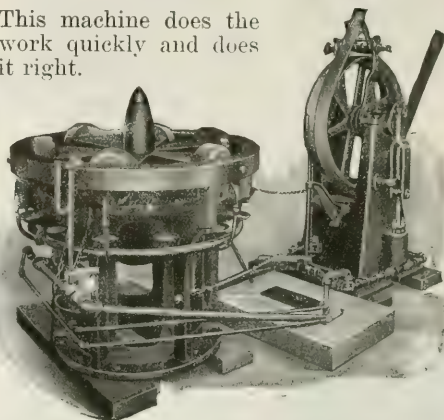
ONTARIO

**This Guarantee Goes With Every Vise:** We fully guarantee all of our Vises to be satisfactory in every particular and will promptly replace, without cost, any parts broken or badly worn when such failures are due to faulty material or construction.

## **Hydraulic Banding Machine**

**For compressing bands on shrapnel shells and other projectiles**

This machine does the work quickly and does it right.



In writing for information or quotation please advise width and thickness of bands and diameter of shells to be handled. Machines for our Canadian Customers are built in Hamilton, Ont.

We also manufacture machines for setting wagon and carriage tires, cold.

Please address all communications to our Rochester Office.

**THE WEST TIRE SETTER COMPANY**  
ROCHESTER, NEW YORK

## Keep Up The Connection

you have made by past efforts in advertising. New friends are alright, but it is a fallacy for one thing, and bad business for another, to create a demand for goods or service and then lose the fruits of your work by default. Letting your old friends know that you want their business is also the surest way to gain new ones.

Advertising in CANADIAN MACHINERY is the medium.

Rate Cards and full particulars on request.



## **ECONOMIC WATER OIL**

SHELL MANUFACTURERS use ECONOMIC WATER OIL for METAL CUTTING of every description; it will not gum nor rust, and it SAVES TIME AND LABOR.

WE CAN SAVE YOU 50% in the COST of your CUTTING MIXTURE BECAUSE

ONE GALLON of ECONOMIC WATER OIL will mix readily with 30 to 50 gallons of WATER, making a thick, creamy emulsion, and giving you a cutting mixture which will not only be satisfactory, but will produce very ECONOMIC RESULTS.

One TRIAL ORDER will prove our STATEMENT.

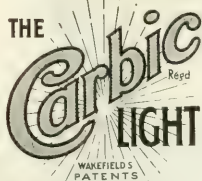
**Made in Canada**

**CANADIAN ECONOMIC LUBRICANT CO.**  
LIMITED

1040-1042 Durocher St.

MONTREAL

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THE CARBIC  
FLARE LIGHT  
2,000 C.P.

BRIGHT  
AS  
SUNLIGHT

URNS  
NIGHT  
INTO DAY

Indispensable for Construction Work,  
Railroad Auxiliaries, Foundries,  
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Absolutely Non-Explosive. Easy to  
Operate. Nothing to Get Out of Order.  
Can be Re-charged in a Minute.

Made in two sizes:

No. 1, Burns 6 hours.

No. 2, Burns 12 hours.

Takes No. 20 Carbic Cake.

Absolutely the most economical  
lamp on the market to-day.

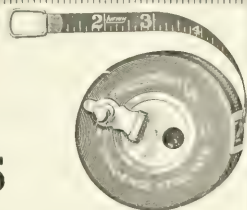
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8 LOMBARD ST., TORONTO, CAN.



**LUFKIN**

**TAPES  
AND RULES**



**NOTED FOR ACCURACY**

We make a complete line of  
MACHINISTS' SCALES      MEASURING TAPES  
FOLDING STEEL RULES      WOOD RULES  
FOLDING BOXWOOD RULES  
SPRING JOINT RULES



Our goods are stocked by prominent hardware  
and supply houses throughout the Dominion.  
They are fully guaranteed.

Catalogue on request.

**THE LUFKIN RULE CO. OF CANADA, LTD.**  
WINDSOR, ONT.

**W**HEN trade begins to boom it will be exceedingly difficult to jump in, overtake and pass the man who continued, even in times of depression, to paddle his advertising canoe.

It will require a high power campaign and lots of anxiety to do it. Even at that the persistent advertiser may beat the other fellow to it.



Why go to the expense of buying new machines for the manufacture of

## SHELLS?

We have already shipped some 75 car-loads of

# Rebuilt Machine Tools

to CANADA since the outbreak of the war, with absolute satisfaction in each case.

If you need any equipment it will be to your advantage to get in touch with us as our facilities for furnishing rebuilt machinery are second to none on the continent.

**EVERY MACHINE WE BUY IS PUT THROUGH OUR OWN SHOPS AND COMES OUT IN ABSOLUTELY PERFECT ORDER—AND WE STAND BEHIND EVERY ONE WE SELL.**

The demand is enormous, but we are not taking advantage of the war by putting on exorbitant prices—our aim is a good, square deal to everybody all the time. You can often get something practically equal to a new machine at a very great saving in price.

As we carry a large stock, we can likely supply you from stock, or if we cannot do this, we will take your order for future delivery, specifying a definite time when we will supply you with such tools as you may require.

**New York Machinery Exchange**  
50 Church St., New York

**Once Known—  
Always Used**



## M. E. C. Collapsible Taps

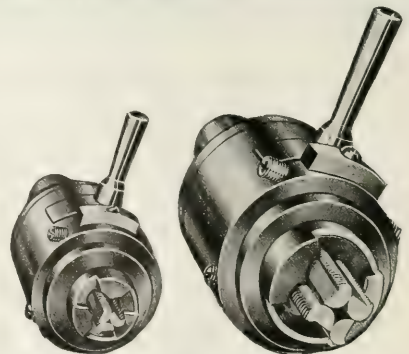
are giving extraordinary service on Shrapnel and Cartridge SHELL work.

It will be Greatly to your interest to get a line on the value of this tap. **WRITE SOME USERS** — we'll gladly send names and addresses.

**Full particulars and details of our liberal proposition on request.**

**Manufacturers Equipment Co.**  
175 North Jefferson St., CHICAGO, U.S.A.

Canadian Agents:  
**FOSS & HILL MACHINERY CO., Montreal.**  
**A. R. WILLIAMS MACHINERY CO., Winnipeg.**



*The advertiser would like to know where you saw his advertisement—tell him.*

# CANADIAN MACHINERY BUYERS' DIRECTORY

TO OUR READERS—Use this directory when seeking to buy any machinery or power equipment.

You will often get information that will save you money.

TO OUR ADVERTISERS—Send in your name for insertion under the headings of the lines you make or sell.

TO NON-ADVERTISERS—A rate of \$5 per line a year is charged non-advertisers.

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Carborundum Co., Niagara Falls, N.Y.  
Canadian Hart Wheels, Ltd., Hamilton, Ont.  
Dom. Abrasive Wheel Co., Toronto.  
Ford-Smith Machine Co., Hamilton, Ont.  
Gardner Machine Co., Beloit, Wis.  
Norton Co., Worcester, Mass.  
Sterns, F. B., Detroit, Mich.

## Acetylene.

L'Air Liquide Society, Montreal, Toronto.

## Acetylene Generators.

L'Air Liquide Society, Montreal, Toronto.

## Accumulators, Hydraulic.

Can. Bommer & Boschert Press Co., Montreal.  
Charles F. Elmes Eng. Wks., Chicago, Wm. Tool Company, Youngstown, O.  
Watson-Stillman Co., Aldene, N.J.  
R. D. Wood Co., Philadelphia, Pa.

## Air Compressors.

Canadian Ingersoll-Rand Co., Ltd., Montreal.  
Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Curtis Pneumatic Machinery Co., St. Louis, Mo.  
Smart-Turner Machine Co., Hamilton.

## Air Hoists.

Q. M. S. Company, Chicago, Ill.  
Whiting Foundry Equipment Co., Harvey, Ill.

## Air Hose.

Can. H. W. Johns-Manville Co., Limited, Toronto.  
Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Can. Ingersoll-Rand Co., Montreal.  
Independent Pneumatic Tool Co., Chicago, Ill.

## Air Receivers.

Can. Ingersoll-Rand Co., Montreal.

## Air Washers.

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## Ammeters.

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Tellman Brass & Metal Co., Hamilton, Ont.

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H. A. Drury Co., Ltd., Montreal.  
Vanadium Alloys Steel Co., Pittsburgh, Pa.

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Hooper-Falkenau Eng. Co., New York.

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Cleveland Twist Drill Co., Cleveland, Ohio.  
Morse Twist Drill and Machine Co., New Bedford.

## Belleville Foundry, Plattsburgh, Que.

Pratt & Whitney Co., Dundas, Ont.

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Skinner Chuck Co., New Britain, Conn.

## Automatic Chucks.

Gavin Machine Co., New York.

## Asbestos Packing.

Can. H. W. Johns-Manville Co., Limited, Toronto.

## Autogenous Welding and Cutting Plants.

L'Air Liquide Society, Montreal, Toronto.

## Automatic Index Milling Machines.

Gavin Machine Co., New York.  
National Machinery and Supply Co., Hamilton.

## Automatic Lowering Devices.

Herbert Morris Crane & Hoist Co., Ltd., Toronto.

## Automatic Machinery.

Rais Machine Co., Bridgeport, Conn.  
A. R. Williams Machy. Co., Toronto.  
Gardner, Robt. & Son, Montreal.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Mott & Merryweather Machy. Co., Cleveland, O.  
National Machinery & Supply Co., Hamilton.

Pratt & Whitney Co., Dundas, Ont.  
Owen Sound Iron Works Co., Owen Sound, Ont.

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Windsor Machine Co., Windsor, Vt.

Automatic Multiple Spindle.

Windsor Machine Co., Windsor, Vt.

Automatic Wood Screw Machines.

Asa F. Cook Co.

Axle Cutters.

Butterfield & Co., Rock Island, Que.

A. B. Jardine & Co., Hespeler, Ont.

Babbitt Metal.

Can. Fairbanks-Morse Co., Montreal.

East Metal Co., Toronto.

Magnolia Metal Co., Montreal.

Tallman Brass & Metal Co., Hamilton.

Baking Ovens.

Oven Equipment & Mfg. Co., New Haven, Conn.

Owen Sound Iron Works Co., Owen Sound.

Ball Bearings.

Can. Fairbanks-Morse Co., Montreal.

Chapman Double Ball Bearing Company, Toronto.

Ball Furnishing Machines.

Baird Machine Co., Bridgeport, Conn.

Banding Machines, Hydraulic.

West Tire Setter Co., Rochester, N.Y.

Barrels, Steel Shop.

Baird Machine Co., Bridgeport, Conn.

Canadian Steel Products Company, Montreal.

Cleveland Wire Spring Co., Cleveland.

Bar Boring.

Charles F. Elmes Eng. Works, Chicago.

Niles-Bement-Pond Co., New York.

Owen Sound Iron Works Co., Owen Sound.

Bar Benders and Straight Edges.

Steel Bending Brake Works, Ltd., Chatham, Ont.

Bar Benders, Hydraulic.

Charles F. Elmes Eng. Works, Chicago.

Gaston & Knight Mfg. Co., Aldene, N.J.

Belt Benches.

Tabor Mfg. Co., Philadelphia, Pa.

Belt Dressing and Cement.

Commercial Oil Co., Hamilton, Ont.

Chicago Rawhide Mfg. Co., Chicago, Ill.

Gaston & Knight Mfg. Co., Montreal.

Belt Lacing, Leather.

Gaston & Knight Mfg. Co., Montreal.

Belt Lacing, Leather.

Can. Fairbanks-Morse Co., Montreal.

Gaston & Knight Mfg. Co., Montreal.

Jones & Glasco, Montreal.

Belting, Cotton.

Dominion Belting Co., Hamilton.

Belt Lacing, Leather.

Can. Fairbanks-Morse Co., Montreal.

Chicago Rawhide Mfg. Co., Chicago, Ill.

Girard Machine & Tool Co., Philadelphia, Pa.

Gaston & Knight Mfg. Co., Montreal.

Van Housen & Co., Montreal.

D. K. McLaren, Ltd., Montreal.

Belting, Stitched Cotton Duck.

Dominion Belting Co., Hamilton, Ont.

Belting, Rubber.

Can. H. W. Johns-Manville Co., Limited, Toronto.

Benders, Angle and Tee Iron.

Can. Buffalo Forge Co., Montreal.

Watson-Stillman Co., Aldene, N.J.

Bending Machinery.

John Bertram & Sons Co., Dundas.

Berrams, Limited, Edinburgh, Scotland.

Bliss, E. W., Co., Brooklyn, N.Y.

Brown Boggis Co., Ltd., Hamilton, Canada.

Can. Buffalo Forge Co., Montreal.

Charles F. Elmes Eng. Works, Chicago.

Jardine, A. B., & Co., Hespeler, Ont.

National Machinery Co., Tiffin, Ohio.

National Machinery & Supply Co., Hamilton.

Niles-Bement-Pond Co., New York.

Owen Sound Iron Works Co., Owen Sound.

Toledo Machine & Tool Co., Toledo, O.

Steel Bending Brake Works, Chatham, Ont.

Watson-Stillman Co., Aldene, N.J.

## Bins, Steel.

Dennis Wire & Iron Works Co., Ltd., London, Canada.

T. W. S. Ltd., Toronto.

## Bit Brace Tools.

Wells Bros. Co., Greenfield, Mass.

Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

## Blast Gauges, Cupola.

Can. Buffalo Forge Co., Montreal.

Sheldons, Ltd., Galt, Ont.

Whiting Foundry Equipment Co., Harvey, Ill.

## Blocks, Lifting.

Herbert Morris Crane & Hoist Co., Ltd., Toronto.

Northern Crane Works, Walkerville.

## Blowers.

Can. Buffalo Forge Co., Montreal.

Can. Sirocco Co., Ltd., Windsor, Ont.

Chicago Flexible Shaft Co., Chicago.

Girard Machine & Tool Co., Philadelphia, Pa.

Sheldons, Ltd., Galt, Ont.

Schwabach Foundry & Machine Co., Philadelphia.

## Blow Pipes and Regulators.

L'Air Liquide Society, Montreal, Toronto.

## Blue Print Machinery.

Revue Machine Co., New York.

## Blunting Ovens.

Oven Equipment & Mfg. Co., New Haven, Conn.

## Boilers.

Can. Locomotive Co., Kingston, Ont.

National Machinery & Supply Co., Hamilton.

Owen Sound Iron Works Co., Owen Sound.

Plattsburgh Foundry, Plattsburgh, Que.

Polson Iron Works, Toronto.

## Boiler Compounds.

Can. H. W. Johns-Manville Co., Limited, Toronto.

## Boiler Graphite.

Dixon Crucible Co., Jersey City, N.J.

## Boiler Makers' Supplies.

Jno. F. Allen Co., New York.

Polson Iron Works, Toronto.

## Bolt Cutters and Nut Tapers.

Wells Brothers Co., Greenfield, Mass.

## Bolts.

Galt Machine Screw Co., Galt, Ont.

Lafont Bolt & Hinge Works, London, Ont.

## Bolt and Nut Machinery.

A. R. Williams Machy. Co., Toronto.

John Bertram & Sons Co., Dundas, Ont.

Owen Sound Iron Works Co., Owen Sound.

Gardner, Robt. & Son, Montreal.

Landis Machine Co., Waynesboro, Pa.

National Machinery Co., Tiffin, O.

National Machinery & Supply Co., Hamilton.

Wiley & Russell Co., Greenfield, Mass.

## Books.

MacLean Publishing Co., Toronto.

## Boring Machines, Upright and Horizontal.

John Bertram & Sons Co., Dundas.

Columb Machine Tool Co., Franklin, Pa.

Detrick & Harvey Machine Co., Baltimore, Md.

Girard Machine & Tool Co., Philadelphia, Pa.

Hill, Clarke & Co., of Chicago, Chicago, Ill.

Mott & Merryweather Machy. Co., Cleveland, O.

National Machinery & Supply Co., Hamilton.

Newton Machine Tool Works, Philadelphia, Pa.

Niles-Bement-Pond Co., New York.

Stow Mfg. Co., Binghamton, N.Y.

O. A. Walworth & Co., Chicago, Ill.

## Boring Machines, Pneumatic.

Cylinder.

Raker Brothers, Toledo, O.

Cleveland Pneumatic Tool Co. of Canada, Toronto.

Can. Fairbanks-Morse Co., Montreal.

Can. Ingersoll-Rand Co., Montreal.

Independent Pneumatic Tool Co., Chicago, Ill.

Newton Machine Tool Works, Philadelphia, Pa.

Stow Mfg. Co., Binghamton, N.Y.

O. A. Walworth & Co., Chicago, Ill.

## Boring Machines (Railroad).

Newton Machine Tool Works, Philadelphia, Pa.

## Boring and Turning Mills.

John Bertram & Sons Co., Dundas.

Columb Machine Tool Co., Franklin, Pa.

Detrick & Harvey Machine Co., Baltimore, Md.

Girard Machine & Tool Co., Philadelphia, Pa.

National Machinery & Supply Co., Hamilton.

Niles-Bement-Pond Co., New York.

O. A. Walworth & Co., Chicago, Ill.

## Box Puller.

Jardine, A. B., & Co., Hespeler, Ont.

## Boxes, Steel Shop.

Cleveland Wire Spring Co., Cleveland.

Boxes, Tote.

Cleveland Wire Spring Co., Cleveland.

## Brakes.

Brown Boggis Co., Hamilton, Can.

Whiting Foundry Equipment Co., Harvey, Ill.

## Brakes, Heavy Plate Bending and Corner.

Steel Bending Brake Works, Ltd., Chatham, Ont.

## Brass Working Machinery.

A. R. Williams Machy. Co., Toronto.

Gardner, Robt. & Son, Montreal.

Girard Machine & Tool Co., Philadelphia, Pa.

National Machinery & Supply Co., Hamilton.

Warner & Swasey Co., Cleveland.

Niles-Bement-Pond Co., New York.

## Brick Cars.

Can. Buffalo Forge Co., Montreal.

Sheldons, Ltd., Galt, Ont.

## Brick Dryers.

Can. Buffalo Forge Co., Montreal.

Can. Sirocco Co., Ltd., Windsor, Ont.

Sheldons, Ltd., Galt, Ont.

## Brick Machinery.

Eastern Machinery Co., New Haven.

Sheldons, Ltd., Galt, Ont.

Bridges, Railway and Highway.

Can. Bridge Co., Walkerville, Ont.

Bucket Elevators.

Pangborn Corporation, Hagerstown, Md.

Buckets, Clam Shell, Crab and Dump.

Herbert Morris Crane & Hoist Co., Ltd., Toronto.

Whiting Foundry Equipment Co., Harvey, Ill.

## Buffing and Polishing Machinery.

Canadian Hart Wheels, Ltd., Hamilton, Ont.

Ford-Smith Machine Co., Hamilton.

Girard Machine & Tool Co., Philadelphia, Pa.



**Castings, Aluminum.**

Cunningham & Son, St. Catharines, Ont.  
Owen Sound Iron Works Co., Ltd., Owen Sound, Ont.  
St. Lawrence Foundry, Galt, Ont.  
Tallman Brass & Metal Co., Hamilton

**Castings, Air Furnaces.**

Wm. Tod Company, Youngstown, O.  
**Castings, Brass.**  
Cunningham & Son, St. Catharines, Ont.

Alexander Fleck, Ltd., Ottawa, Ont.  
T. C. Lawrence Foundry, Galt, Ont.  
Owen Sound Iron Works Co., Owen Sound.  
Plessville Foundry, Plessville, Que.  
Tallman Brass & Metal Co., Hamilton  
Wm. Tod Company, Youngstown, O.

**Castings, Bronze.**

Cunningham & Son, St. Catharines, Ont.  
Tallman Brass & Metal Co., Hamilton  
Wm. Tod Company, Youngstown, O.

**Castings, Copper.**

Cunningham & Son, St. Catharines, Ont.  
Tallman Brass & Metal Co., Hamilton, Ont.

**Castings, Gray Iron.**

Brown, Boggs Co., Ltd., Hamilton, Canada.  
Castings of Ottawa, Ottawa, Ont.  
Erie Foundry Co., Erie, Pa.  
Alexander Fleck, Ltd., Ottawa.  
Gardner, Robt., & Son, Montreal.  
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.  
Owen Sound Iron Works Co., Owen Sound.  
Plessville Foundry, Plessville, Que.  
Wm. Tod Company, Youngstown, O.

**Castings, Steel Chrome and Manganese Steel.**

Electric Steel & Metals Co., Welland.  
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.  
Wm. Tod Company, Youngstown, O.

**Castings, Malleable.**

Galt Malleable Iron Co., Galt.  
**Castings, Nickel Steel.**  
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.

**Cement, Disc Wheel.**

Gardner Machine Co., Beloit, Wis.  
**Cement, Iron.**  
Can. H. W. Johns-Manville Co., Ltd., Red, Toronto.

**Cement Machinery.**

Can. Fairbanks-Morse Co., Montreal.  
Gardner, Robt., & Son, Montreal.  
National Machinery & Supply Co., Hamilton, Ont.  
Owen Sound Iron Works Co., Owen Sound.

**Centre Reamers.**

Wells Brothers Co., Greenfield, Mass.

**Centering Machines.**

John Bertram & Sons Co., Dundas.  
Gardner, Robt., & Son, Montreal.  
Girard Machine & Tool Co., Philadelphia, Pa.  
National Machinery & Supply Co., Hamilton.  
Niles-Bement-Pond Co., New York.  
Pratt & Whitney Co., Dundas, Ont.

**Centrifugal Pumps.**

Can. Buffalo Forge Co., Montreal.  
Pratt & Whitney Co., Dundas, Ont.  
Smart-Turner Machine Co., Hamilton, Ont.

**Chain Blocks.**

Can. Fairbanks-Morse Co., Montreal.  
Herbert Morris Crane & Hoist Co., Ltd., Toronto.  
National Machinery & Supply Co., Hamilton.

**Chain Slings.**

Herbert Morris Crane & Hoist Co., Ltd., Toronto.  
**Chain Clutches.**  
Herbert Morris Crane & Hoist Co., Ltd., Toronto.

**Chains, Silent and Transmission.**

Jones & Glasse, Montreal.  
John Milten & Son, Montreal.  
Morse Chain Co., Ithaca, N.Y.  
Plessville Foundry, Plessville, Que.  
Chemists.  
Toronto Testing Laboratory, Ltd., Toronto.

**Chucks, Aero, Automatic.**

Garrin Machine Co., New York.  
**Chucks, Drill, Lathe and Universal.**  
John Bertram & Sons Co., Dundas, Ont.

Buffalo Forge Co., Buffalo, N.Y.  
Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland.  
Cushman Chuck Co., Hartford, Conn.  
Gardner, Robt., & Son, Montreal.  
Girard Machine & Tool Co., Philadelphia, Pa.

Wells Brothers Co., Greenfield, Mass.  
Jacob Mfg. Co., Hartford, Conn.  
Ker & Goodwin, Brantford.  
Modern Tool Co., Erie, Pa.  
Morse Twist Drill & Machine Co., New Bedford.  
National Machinery & Supply Co., Hamilton.  
Skinner Chuck Co., New Britain, Conn.  
D. E. Whitton Machine Co., New London, Conn.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Chucks, Drill, Automatic and Keyless.**

Buffalo Forge Co., Buffalo, N.Y.

**Chucks, Ring Wheel.**

Gardner Machine Co., Beloit, Wis.

**Chucking Machines.**

W. F. Davis Machine Co., Rochester, N.Y.  
Gardner Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.  
New Britain Machine Co., New Britain, Conn.  
Niles-Bement-Pond Co., New York.  
Turner Machine Co., Danbury, Conn.  
Warner & Swasey Co., Cleveland, O.

**Cinder Mills.**

W. W. Sly Mfg. Co., Cleveland, O.

**Cleaning Mills.**

W. W. Sly Mfg. Co., Cleveland, O.

**Cloth and Wool Dryers.**

Canada Wire & Iron Goods Co., Hamilton, Ont.  
Sheldons, Limited, Galt.

**Clutches.**

Eastern Machinery Co., New Haven, Conn.  
Jones & Glasse, Montreal.  
Owen Sound Iron Works Co., Owen Sound.  
Footstep Clutch & Pulley Works, Ltd., Toronto.

**Coal Handling Machinery.**

Whiting Foundry Equipment Co., Harvey, Ill.

**Coke and Coal.**

Hanna & Co., M. A., Cleveland, O.  
**Collectors. Pneumatic.**  
Can. Buffalo Forge Co., Montreal.  
Sheldons, Limited, Galt.

**Compressors, Air.**

Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Independent Pneumatic Tool Co., Chicago.  
National Machinery & Supply Co., Hamilton.  
The Smart-Turner Machine Co., Hamilton.

**Concentrating Plant.**

Gardner, Robt., & Son, Montreal.

**Concrete Mixers.**

A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
National Machinery & Supply Co., Hamilton.

**Concrete Reinforcement.**

Canada Wire Goods Mfg. Co., Hamilton.  
**Condensers.**  
Can. Buffalo Forge Co., Montreal.  
The Smart-Turner Machine Co., Hamilton.  
Southpark Foundry & Machine Co., Philadelphia.

**Consulting Engineers.**

Hooper-Falkenau Eng. Co., New York.

**Controllers and Starters.**

Electric Motor.  
A. R. Williams Machy. Co., Toronto.  
Toronto & Hamilton Electric Co., Hamilton, Ont.

**Conveyors, Belt and Screw.**

Fanchon Corporation, Hagerstown, Ind.  
**Conveyor Machinery.**  
Can. Fairbanks-Morse Co., Montreal.  
Can. Matthews Gravity Carrier Co., Toronto.

**National Machinery & Supply Co.**

Plessville Foundry, Plessville, Que.  
The Smart-Turner Machine Co., Hamilton.

**Coping Machines.**

Can. Buffalo Forge Co., Montreal.  
John Bertram & Sons Co., Dundas.  
National Machinery & Supply Co., Hamilton, Ont.  
Niles-Bement-Pond Co., New York.

**Cornice Brakes.**

Brown Boggs Co., Ltd., Hamilton, Canada.  
Steel Banding Brake Wks., Chatham.

**Counting Machines.**

National Scale Co., Chicopee Falls, Mass.  
C. J. Root Co., Bristol, Conn.

**Counterbores and Countersinks.**

Cleveland Twist Drill Co., Cleveland.  
Detroit Twist Drill Co., Detroit, Mich.  
Morse Twist Drill & Machine Co., New Bedford.  
Pratt & Whitney Co., Dundas, Ont.  
Wells Bros. Co., Greenfield, Mass.  
Whitman & Barnes Mfg. Co., St. Catharines, Ont.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Countershafts.**

Rail Machine Co., Bridgeport, Conn.  
Standard Pressed Steel Co., Philadelphia, Pa.  
Wells Bros. Co., Greenfield, Mass.

**Country House Lighting and Cooking.**

Can. Blaugas Co., Montreal.

**Couplings.**

Can. H. W. Johns-Manville Co., Ltd., Toronto.  
Eastern Machinery Co., New Haven, Conn.  
Gardner, Robt., & Son, Montreal.  
Owen Sound Iron Works Co., Owen Sound, Ont.

**Couplings, Air Hose.**

Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Independent Pneumatic Tool Co., Chicago.

**Crabs, Travelling.**

Herbert Morris Crane & Hoist Co., Ltd., Toronto.  
Owen Sound Iron Works Co., Owen Sound.

**Cranes, Locomotive.**

Northern Crane Works, Walkerville.

**Cranes, Gantry.**

Herbert Morris Crane & Hoist Co., Ltd., Toronto.  
Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Goliath.**

Herbert Morris Crane & Hoist Co., Ltd., Toronto.  
Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Hydraulic.**

Watson-Stillman Co., Alders, N.J.  
**Cranes, Pneumatic.**  
Northern Crane Works, Walkerville.  
Q. M. S. Co., Chicago, Ill.

Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Post Jib.**

Northern Crane Works, Walkerville.  
Q. M. S. Co., Chicago, Ill.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Portable.**

Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Swing Jib.**

Northern Crane Works, Walkerville.  
Q. M. S. Co., Chicago, Ill.  
Smart-Turner Machine Co., Hamilton, Ont.

Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Transfer.**

Herbert Morris Crane & Hoist Co., Ltd., Toronto.  
Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.

Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Wall.**

Herbert Morris Crane & Hoist Co., Ltd., Toronto.  
Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.

Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Travelling Electric and Hand Power.**

Dominion Bridge Co., Montreal.  
Herbert Morris Crane & Hoist Co., Ltd., Toronto.  
Niles-Bement-Pond Co., New York.

Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Crane, Chain.**

Northern Crane Works, Walkerville.

**Cranes, All Kinds.**

Northern Crane Works, Walkerville.  
Owen Sound Iron Works Co., Owen Sound, Ont.  
Southpark Foundry & Machine Co., Philadelphia.

Whiting Foundry Equipment Co., Harvey, Ill.

**Crank Pin Turning Machine.**

Niles-Bement-Pond Co., New York.

**Crimps, Leather.**

Graton & Knight Mfg. Co., Montreal.

**Cupolas.**

Can. Buffalo Forge Co., Montreal.  
Crawford & Sons, Walkerville.  
Sheldons, Ltd., Galt, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cupola and Blast Gate Blowers.**

Can. Sirocco Co., Ltd., Windsor, Ont.  
Cupola Blast Gauges & Blowers.  
Sheldons, Ltd., Galt, Ont.

**Cutters, Angle, Tee Iron and Bar.**

Can. Buffalo Forge Co., Montreal.

**Cutters, Flue.**

Independent Pneumatic Tool Co., Chicago.  
Cleveland Pneumatic Tool Co. of Canada, Toronto.

**Cutters, Pipe.**

Can. Fairbanks-Morse Co., Montreal.  
A. B. Jardine & Co., Hespeler, Ont.  
Trimont Mfg. Co., Roxbury, Mass.

**Cutting Compound and Cutting Oil.**

Can. Economic Lubricant Co., Montreal.  
Commercial Oil Co., Hamilton, Ont.  
Crescent Oil Co., New York.

**Cutter Grinders and Attachments**

Cincinnati Milling Machine Co., Cincinnati.  
Garrin Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.

**Cutters, Milling.**

A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland.  
Detroit Twist Drill Co., Detroit, Mich.  
Erie Foundry Co., Erie, Pa.  
Morse Twist Drill and Machine Co., New Bedford.  
Tabor Mfg. Co., Philadelphia, Pa.  
Pratt & Whitney Co., Dundas, Ont.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Cutting-off Machines.**

Armstrong Bros. Tool Co., Chicago.  
John Bertram & Sons Co., Dundas.  
Can. Fairbanks-Morse Co., Montreal.  
W. P. Davis Machine Co., Rochester, N.Y.  
Earle Gear & Machine Co., Philadelphia, Pa.  
Espen-Lucas Machine Wks., Philadelphia, Pa.  
Garrin Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Geo. Gorton Machine Co., Racine, Wis.

Northern Machine Tool Works, Philadelphia, Pa.  
Nutter & Barnes Co., Hixdale, N.H.  
Pratt & Whitney Co., Dundas, Ont.  
Q. M. S. Co., Chicago, Ill.

Tabor Mfg. Co., Philadelphia, Pa.  
J. S. Barrett & Co., Bethel, Me.

**Dampers, Regulators.**

Can. Fairbanks-Morse Co., Montreal.

**Derricks.**

Dominion Bridge Co., Montreal.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Designers, Special Machinery.**

Baird Machine Co., Bridgeport, Conn.  
Hooper-Falkenau Eng. Co., New York.

**Dies and Die Stocks.**

Armstrong Mfg. Co., Bridgeport, Conn.  
Banfield, W. H. & Son, Toronto.  
Cleveland & Co., Rock Island, Que.  
Brown, Boggs & Co., Hamilton, Ont.  
Can. Fairbanks-Morse Co., Montreal.  
Duncan Electric Co., Montreal.  
Gardner, Robt., & Son, Montreal.  
Greenfield Tap & Die Corporation, Greenfield, Mass.

A. B. Jardine & Co., Hespeler, Ont.  
Modern Tool Co., Erie, Pa.  
Morse Twist Drill and Machine Co., New Bedford.

Pratt & Whitney Co., Dundas, Ont.  
Wiley & Son, Philadelphia, Pa.

**Dies for Bit Brace Use.**

Wells Brothers Co., Greenfield, Mass.

**Die Castings.**

Tallman Brass & Metal Co., Hamilton

**Die Sinks.**

Garrin Machine Co., New York.

**Dies for Ruching.**

Can. Fairbanks-Morse Co., Montreal.  
Wells Brothers Co., Greenfield, Mass.

**Die Sinking Presses, Hydraulic.**

Charles F. Elmes Eng. Works, Chicago.  
Watson-Stillman Co., Alders, N.J.

**Dies, Self-opening.**

Duncan Electric Co., Montreal.  
Gemco Tool Co., New Haven.  
Greenfield Tap & Die Corporation, Greenfield, Mass.  
Lands Machine Co., Weymouth, Pa.  
Modern Tool Co., Erie, Pa.  
Murphy Machine & Tool Co., Detroit

## A Lot of Holes Are Hidden Here

When you look at a freshly stored electric battery you can't see the energy in it but you know it's there. When you look at

## Cleveland Twist Drills

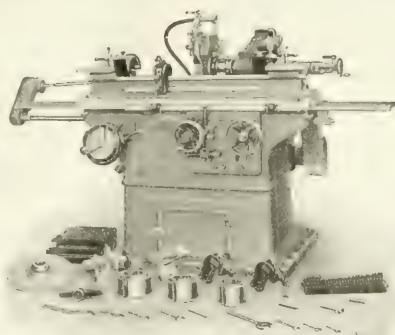
you know that accurate, clean holes through metal are available in the use of them. You can be sure of this because they hold the record.

One of them drilled at the rate of  $57\frac{1}{2}$ " or metal per minute. They are made of scientifically selected and tested materials and with scientific heat treatment.

Ask us to mail you each month  
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**Cleveland Twist Drill Co.**

New York Cleveland Chicago



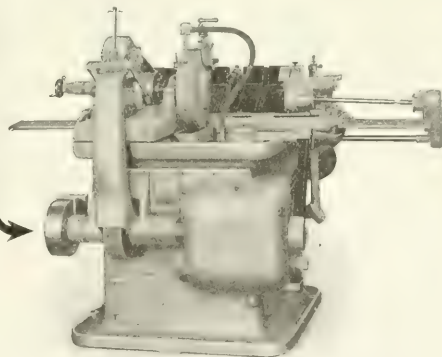
Here are two reasons why our new design NOS. 10 and 11 *PLAIN GRINDING MACHINES* will give you maximum production and economy.

## Simple, Centralized Work Control

Just three levers grouped around a dial. One instantly stops and starts work and table travel together. The other two regulate work speed and table travel. Moving them around the dial like controller handles, while work is running, causes speed or traverse to increase or decrease, not by jumps, but steadily. The multiple friction disk mechanism gives a finely graduated range so that any feed and speed combination desired is instantly available.

## Single Pulley, Constant Speed Drive

Complicated overhead works eliminated. Use a constant speed motor attached to machine base for driving if desired. All speed and feed changes are within machine. It is thus compact and not difficult to arrange for on shop floor. Wheel speed changes made by means of split spindle pulleys changed without shifting belt. Capacities of machines, 6" x 20" and 12" x 32". May we send an illustrated circular describing the many cost-cutting features?



## Brown & Sharpe Mfg. Co. PROVIDENCE, R.I., U.S.A.

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WILLIAMS & WILSON, Montreal

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Sound.

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Baird Machine Co., Bridgeport, Conn.  
Can. Sirocco Co., Ltd., Windsor, Ont.  
Pleasantville Foundry, Pleasantville, Que.  
Sheldons, Ltd., Galt, Ont.  
The Smart-Turner Machine Co., Hamilton.

**Feed Water Heaters.**  
Can. Fairbanks-Morse Co., Montreal.  
The Smart-Turner Machine Co., Ham-  
ilton.

**Fence, Iron Factory.**  
Canada Wire & Iron Goods Co

Dennis Wire & Iron Works Co., Ltd.,  
London, Canada.

**Files.**  
American Swiss File & Tool Co.

Delta File Works, Philadelphia, Pa.  
Nicholson File Co., Port Hope, Ont.

**Fire Extinguishers.**  
Can. H. W. Johns-Manville Co.,

Canada Wire & Iron Goods Co.

Dennis Wire & Iron Works, London,  
Ont.

**Flexible Shafts.**  
Chicago Flexible Shaft Co., Chicago.

Stow Mfg. Co., Binghamton, N.Y.  
Flumes.

Toronto Iron Works, Ltd., Toronto.  
**Forges, Hand, etc.**

Can. Buffalo Forge Co., Montreal.  
Independent Pneumatic Tool Co.,  
Chicago, Ill.

National Machinery & Supply Co.,  
Hamilton.  
Sheldons, Limited, Galt, Ont.

**Forgings, Drop, Automobile and Locomotive.**

Bliss, E. W., Co., Brooklyn, N.Y.  
Canadian Billings & Spencer, Ltd.,  
Welland.

**Forging Hammers, Belt-Driven.**  
Bliss E. W. Co., Brooklyn, N.Y.

Forging Hammers, Steam.

Erie Foundry Co., Erie, Pa.  
Forging Ingots.  
Electric Steel & Metals Co., Welland.

Forging Machinery.  
John Bertram & Sons Co., Dundas.

Bliss, E. W., Co., Brooklyn, N.Y.  
Brown, Boggs Co., Ltd., Hamilton,  
Canada.

National Machinery Co., Tiffin, Ohio.  
Plessisville Foundry, Plessisville, Que.  
Wm. Tod Company, Youngstown, O.

Watson-Stillman Co., Aldene, N.J.  
Foundry Engineers.

Hooper-Falkenau Eng. Co., New York.  
Foundry Equipment.  
Matheson Crane Works, Walkersville

Whiting Foundry Equipment Co.,  
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Friction Leathers.  
Graton & Knight Mfg. Co., Montreal.

Friction Clutch Pulleys, etc.  
Baird Machine Co., Bridgeport, Conn.

Eastern Machinery Co., New Haven,  
Conn.  
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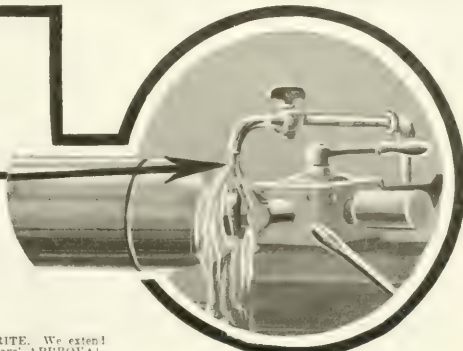
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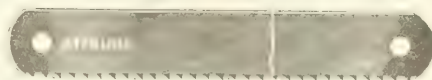
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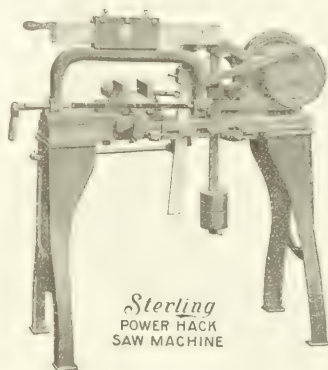
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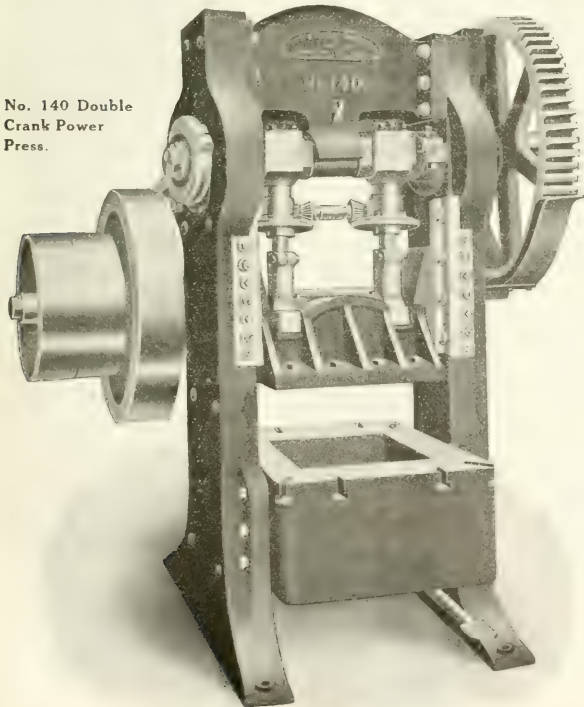
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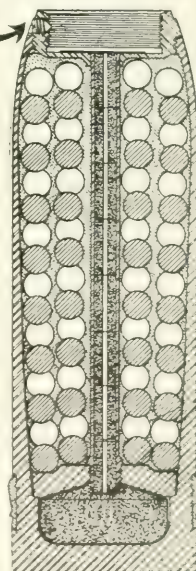
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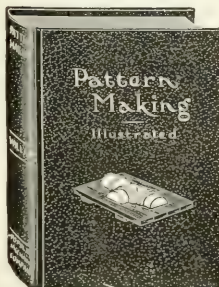
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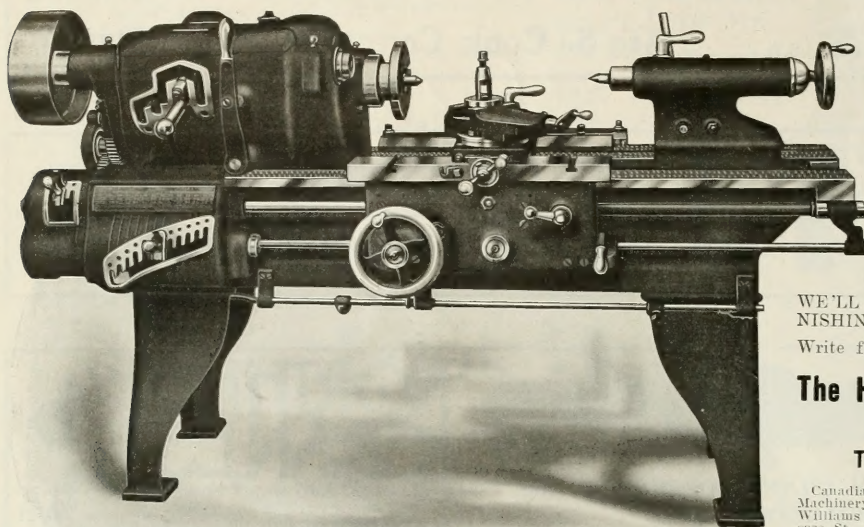


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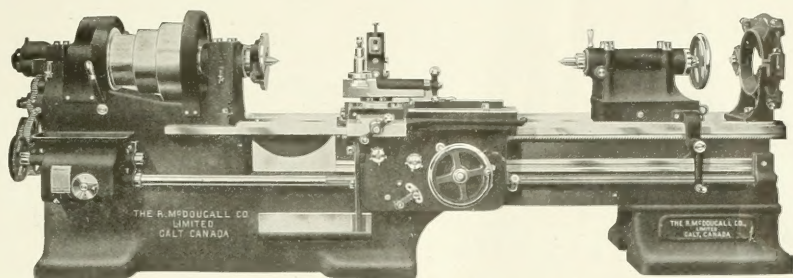
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Gap Lathes**

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**Strength  
Accuracy  
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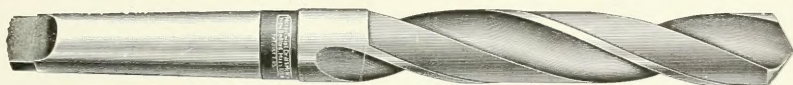
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